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ORIGINAL ARTICLES.

OIL CYSTS IN THE PERIPHERY OF THE ORBIT.*

BY PROFESSOR PANAS.

(*Translated by Dr. Adolf Alt.*)

IT is not very long since the cysts which take their origin from the periphery or the interior of the orbit were confounded with similar growths found in other parts of the tegments, the scalp especially, and generally designated as atheromata.

This confusion was due to the similarity of the contents of the sac, forming a sort of gruel, resembling more or less the putty of the glazers, to which may be added other products, as hair, epidermic scales, sometimes crystals of cholesterin, more rarely lime or some bone tissue.

Lebert† by the microscopical study of the wall of congenital orbital cysts, has established the fact that they possess all the attributes of true derma, that is, that besides adult connective tissue elements, are found elastic fibres, sometimes non-striated muscular fibres, hair-follicles, sebaceous and even sudoriparous glands. He also named them dermoid cysts, reserving the name atheroma for those the walls of which consist solely of condensed connective tissue

*Archives d'Opthalmologie, December, 1902.

†Mem. de la Soc. de biologie, 1852, V. IV.

lined with epithelium. In these the glandular elements and muscular fibres are wanting. The summit of an atheromatous cyst always adheres to the skin where the follicle, from which it originated, opened on the surface. This is not the case with dermoid cysts which never adhere to the skin which covers them.

Another point of distinction which is no less important is the fact that atheromata appear at an advanced period of life, while the dermoids grow from the beginning of infancy and start to grow rapidly near the age of puberty.

The site of predilection of the dermoids corresponds with the branchial slits. That is why these cysts are found in the periphery of the orbit where the two branchial slits of the face, the internal vertical and the external oblique one, join it. They are rarely found just up or downwards and still more rarely just over the root of the nose. This has been seen in but five or six cases.

Aside from the hair, the number of which varies and which may even be wanting, the contents of the dermoid consist of exfoliated epithelial cells and fat in variable quantity, according to the number of sebaceous glands. An abundant serous fluid is found only in the exceptional cases in which the sudociparous glands predominate.

By the name of oil cysts, which we want to speak of here, we designate a variety in which the sac, which is fluctuating, smooth, tense and often semi-transparent, contains exclusively an oily fluid, either of a brownish color or colorless. In the first cases the contents consist of oleates, margarates and stereates, which are insoluble in water; in the second case of glycero-stereates and palmidates, which are more or less soluble in water. These two varieties of contents congeal at the ordinary temperature so as to look like butter of cocoa previously heated.

Frequently we encounter little grumous masses of a caseous appearance; they consist of exfoliated epithelial cells, mixed, especially when the cyst has grown large, with round embryoplastic cells and giant cells, the origin of which we shall look for later on.

When carefully studying under the microscope the wall of dermoid cysts, and particularly of the oily ones, we are forced

to distinguish between the posterior or deep pole of the cyst and its anterior one under the skin. Little pronounced at first, this difference becomes more apparent as the cyst grows. Macroscopically the first one, which often adheres to the underlying periosteum, remains much thicker and continues to show all the attributes of true skin, as chorion, stratified epithelium, hair-follicles and glandular adnexa. The second one, on the contrary, is stretched more and more, assumes the appearance of a smooth serous membrane, is poorly supplied with sebaceous glands and hair-follicles, and is often in places or altogether denuded of epithelium. When examining more closely the chorion in the denuded places is found to be covered by a stratum granulosum, formed of round embryoplastic cells, as they are produced by an ulcerative process, and of a great many polymorphous multi-nucleated cells, a form of giant cells which, according to Mitwalsky,* are more numerous than in tubercular follicles. These are, however, but wandering cells, which bring about the formation of a cicatrical tissue which has no epithelium.

In specimens made at our laboratory by Vassaux and Broca† we have verified these conditions of the walls. While, however Mitwalsky sees there an ulceration in the pre-existing derma, Vassaux puts forth the hypothesis that the dermoid inclusion might come, not from the incarceration of the sac, but from an epiblastic fragment the secretions of which, as sebaceous matter, hair and exfoliated epithelium, might be encapsulated in the subcutaneous connective tissue. This might explain the histologic difference between the deep and superficial parts of the cyst, the first being purely dermoid, the latter connective tissue without epithelium. Another explanation, according to Vassaux, might be a rupture by distension, by which the contents of the sac escape into the subcutaneous connective tissue, with perhaps a subsequent encapsulation as it happens with the blood in the formation of a false aneurism. Mitwalsky's answer is that a spontaneous rupture of a dermoid, as it was first mentioned by Spencer Watson, has not been demonstrated, and that he can only see a special ulcerative process in the cyst wall, due to the

*Arch. f. Aug., V. XXIII., p. 109.

†Panas, Traité des mal. des yeux, 1894, Vol. II., p. 189.

rapid distension of the cyst near the age of puberty. At any rate, we must here explain the presence of the great number of giant cells.

In the modified part of the cyst the secreting glands atrophy, are diminished in number and may disappear altogether on account of the increasing stretching. The sebaceous glands which lie in the cyst wall itself are the first to be altered, while the sudoriparous glands which are subdermic, resist longer, and their tubular form is changed into that of an utriculus. In the oil cysts the sebaceous glands are very numerous, while the hair-follicles and hair remain rudimentary, and the epithelial coating becomes thinner and even wanting in places. From this result the abundant contents, consisting of pure oil or an uncolored liquid composed of glycerine united with fat, oil and palmidic acids.

All of the oil cysts, known so far, have been situated in the periphery of the orbit, more especially at its nasal side, or at the tail of the eyebrow. Rarely have they been seen down or outwards; one was situated at the temple (Fieuzal).*

The predilection of these cysts for the nasal angle, where they lie subcutaneously, encroaching more or less on the region of the lacrimal sac, prompted Vernueil to consider them as a special class under the name of prelacrimous cysts, not knowing that Cruveilhier† had described an oil cyst situated at the tail of the eyebrow, and that Paget‡ had spoken of the scarcity of preorbital oil cysts.

Since then such observations have been multiplied, and we may cite those of Rava, Burow, Demons of Bordeaux, P. Berger, Fieuzal, Albert of Vienna, Mitwalsky and Chavasse.§

Mitwalsky, who had particular opportunities, found three oil cysts among fourteen orbital dermoids, and Hirschberg no less than three in eleven, an even larger proportion. I myself have had but a small number to treat. Among these is the relatively exceptional case at the tail of the eyebrow, mentioned above.

A malignant degeneration of the circumorbital dermoids is very rare, and has been described only once, as far as I

*Bull. de la clinique opt. des Quinze-Vingt, 1887, p. 196.

†Essai sur l'anat. path. génér., 1816, V. I., p. 303.

‡Lectures on tumors.

§Academie de Med., June 4, 1901.

know, by Wolff.* The patient was a man, 21 years of age, who came to Bergmann's clinic on account of a small tumor situated at the upper orbital margin, having existed since birth, and showing no sign of inflammation. The removal of the tumor showed that it was a cyst with the contents of a dermoid, the walls of which showed an undoubted cancerous degeneration, which had appeared in the last two years, during which the tumor had perceptibly grown.

Case 1.—Recently I have observed a case of oil cyst in a young girl, 18 years of age, small of stature, of good constitution, without noteworthy personal nor inherited antecedents. Only, her molar teeth are decayed, while the incisors are rough, yellowish and have transverse depressions as there are seen in rhachitic and dyscrasic individuals. There is no other sign of rhachitis on the tibia or other bony parts. When she was one year old a small subcutaneous tumor of the size of a pea was noticed by the mother on the left side near the tail of the eyebrow and attributed to a trauma received a little while previously.

Things remained unaltered till the age of 10 years, when a gradual increase took place to the present volume, that of a pigeon egg, the base of which lies at the head of the eyebrow and the apex in the neighborhood of the ligamentum palpebrale internum.

The skin above it is perfectly normal, shows no cicatrix and is not adherent to the tumor. The consistency of the tumor is uniform and fluctuation easily felt. Under oblique illumination a semi-transparency is noticed. There is no pain, and there never were any inflammatory signs at any time.

On account of these symptoms, together with the congenital appearance, which we may take for certain, I did not hesitate an instant to make the diagnosis of a dermoid prelacrimal oil cyst.

The removal three days later confirmed the diagnosis. It is unnecessary to add that the wound was healed by first intention on the fifth day, when the stitches were removed. When I saw the patient two weeks later she complained of some shooting pains on the side of the root of the nose, re-

*Deutsche Zeitschr. f. Chir., 1901, V. LVIII.

sulting from wounds to terminal filaments of the external nasal nerve. This was proven by an anæsthetic spot on the skin, which reached up to the glabella. Doubtless these pains and the anæsthesia will disappear, thanks to the regeneration of the nerve fibres.

The histological examination of the sac gave the following results:

As always, when a cyst is growing, there is a difference in the constitution of the wall of the superficial and posterior half. The former was made up, instead of derma, of a dense connective tissue stroma without chorion and devoid of an epithelial covering; the other, adherent to the periosteum, was, on the contrary, completely dermic and lined with normal stratified epithelium. Here there were numerous hair-follicles with rudimentary hair, supplied at their base with voluminous sebaceous glands, which on account of their abundance formed a continuous stratum, from which doubtlessly came the fluid oily contents, reminding one, on account of their transparency and lack of color, of glycerine, but differing from it by becoming congealed in the outer temperature of the room. We found no sudoriparous glands, which proves that they must have been scarce in this specimen.

It is interesting to compare these findings with the three cases of oil cysts examined anatomically by Mitwalsky (*loc. cit.*) and described as 9, 12 and 13.

The first case, in a man 24 years of age, was a cyst as large as a pigeon egg, situated over the temporal commissure of the right eye, adhering to the frontal bone, and containing an uncolored liquid, composed of glycero-oleate and glycero-palmidate. The wall of the cyst purely dermic posteriorly where it adhered to the periosteum of the frontal bone, was, on the contrary, thin, ulcerated and without epithelial covering in front.

The second case, in a woman 30 years of age, was a dermoid, the size of a hazelnut, at the outer angle of the left eye. It was very transparent, which showed the thinness of its superficial wall, which measured only two mm., and was smooth like a serous membrane, while the deep wall was perfectly dermic, and two mm. in thickness by one centimeter

in extent. There were but a few fine white hair and sebaceous glands in front, while farther back there were some hair, hard like cilia, and very numerous and large sebaceous glands, but no sudoriparous ones. The part of the cyst which looked like a serous membrane had no epithelial covering.

The third case, in a woman 37 years of age, was a cyst, the size of a pigeon egg, situated at the upper inner left orbital margin, reaching partly into the upper lid, partly into the orbit. On account of its deep seat no transparency could be noticed. It was removed in two operations. The oily contents without color, with sparse white grumous masses, consisted of glycero-oleates and palmidates. The structure of the wall was identical with that of the two preceding cases. At the bottom of it there was an island, one centimeter in diameter, of pure skin. The remainder of the walls, from two to four mm. thick, consisted of fibrillar connective tissue with a thin granulosa completely devoid of epithelium. There were atrophied hair-follicles, mostly sterile, but at the level of the island of skin surrounded by large sebaceous glands. Here and there smooth muscular fibres and a few terminal nerve fibres were found.

(Here follows a similar case, reported by Steindorff* from Hirschberg's clinic, without microscopical examination.)

We may note that Hirschberg found three oil cysts among eleven peribulbar dermoids, or 27.3 per cent., which is nearly the same as Mitwalsky's. But 25 cases are not enough to consider these numbers as definite. With Paget, we think the percentage somewhat too high.

The diagnosis of an oil cyst should offer no difficulty to any one with the necessary clinical experience. Their perfect fluctuation and their usually prelacrimal situation show the way, especially if they are congenital or have appeared at an early age. One might think of an encephalocele only concerning those cysts which lie more or less near the glabella. The fact, however, that they cannot be compressed between the fingers and that we cannot feel an osseous rim where they adhere to the periosteum or bone, is sufficient to establish their identity. When in doubt it will be well to make an explorative puncture, especially when the efforts and the

*Centralbl. f. pr., August, 1900, p. 140.

screams of the child stretch the cyst like a veritable encephalocele, or when we wish to differentiate between an oil cyst and those much rarer ones with serous contents. I do not mention here the very rare pseudo-fluctuating lipomata, which can be distinguished, when taken between index and thumb, on account of their lobulation.

The prognosis is, of course, absolutely good. We are usually called upon to operate on account of the disfigurement or in order to calm the apprehension of the patient and his friends, who are frightened when they notice the rapid increase in size near the age of puberty. We know of no case in which the cyst penetrated into the lacrimal sac, and when we find such a perforation we must at once think of an operative fault. What is the most troublesome with dermoids, as well as with other cysts, is to dissect them from the periosteum, where they adhere more or less firmly. This is the reason that it happens so often that the sac is opened and lets some of its oily contents escape during the operation; this accident is, however, unimportant, and in such a case, having dissected the larger part of the wall, the remainder is best removed with a sharp spoon. This is much better than to leave it behind and to be satisfied with a slow cure by spontaneous exfoliation. This latter method requires the employment of a drain or antiseptic gauze to the detriment of an immediate reunion, and gives rise to the risk of leaving for a long time a fistulous opening which is fraught with inconvenience and danger. Here, as elsewhere, a late microbic infection may take place, especially with the streptococcus, and give rise to erysipelatous attacks, as has been observed in cases of frontal and maxillary sinusitis, treated by so-called conservative methods.

PAMPHLETS RECEIVED.

"Pneumatic Massage in Aural Practice," by E. Pynchon, M.D.

"The Cardiac and Vascular Effects of Operations on the Middle Ear," by H. O. Reik, M.D.

"A Case of Cerebellar Abscess After Infection Through the Labyrinth; Death from Meningitis," by A. Knapp, M.D.

CONTRIBUTION TO THE ETIOLOGY OF MYOPIA.*

By J. E. WIDMARK, M.D.,

Professor of Ophthalmology, Stockholm.

THE etiology of myopia is a subject that has greatly puzzled oculists, and many theories have been suggested as to its cause. All, however, agree that overstraining of the eye by close work during adolescence plays a decisive part in its causation, but there is not the same unity of opinion as to which factor of the visual act produces myopia. In the conception of an object the eye performs principally three actions—accommodation, convergence, and seeing in a limited sense, that is to say, the perception in the retina and the connected processes at the posterior pole of the eye.

In attempting to explain the origin of myopia the attention has mainly been fixed upon the two first-mentioned—accommodation and convergence, but much importance has not been ascribed to the third—the perception in the retina. The opinion that accommodation plays any important part in the origin of myopia seems now to have been given up by most authors. On the other hand, the theory of convergence has gained many adherents. Meanwhile, cases of myopia are often met with in practice which cannot be explained by this theory. That which especially has aroused my doubts on this point is the different effects which corneal opacities and astigmatism appear to exert on the development of myopia whether they occur only in one eye or in both. That opacities of the cornea appearing in childhood favor the development of myopia is a well-known fact. So it seems also to be with astigmatism, the predisposing importance of which for the development of myopia has been made probable by the investigations of Javal and Nordenson.

Opacities of the cornea and astigmatism lead to myopia probably because they reduce the vision and so render close work more difficult. But if corneal spots and astigmatism occur in one eye only, it is, according to my experience, the other sound eye which is in the first place affected with myopia, and when astigmatism in different degrees affects both eyes, myopia is developed particularly or exclusively on

*British Medical Journal.

the least astigmatical eye. As instances of this I will give some cases which have occurred in my practice:

CASE 1.—A girl of 20 consulted me on February 20, 1890. In childhood she had suffered from strumous keratitis on the right eye and became shortsighted while at school. On the right eye was a central corneal spot. Emmetropia V=0.1. The left cornea was clear, the eye myopic, 7.50 D. V=1.0.

CASE 2.—A colonel, aged 64, consulted me on November 23, 1894. His right eye had been weak-sighted as far back as he could remember; his left eye became shortsighted while at school. My examination gave the following result: R. E., astigmatism + 3 D. 70°. V=0.4. L. E., myopia, 6 D. combined with astigmatism—1 D. against the rule. V=0.09.

CASE 3.—An architect, aged 40, consulted me on October 27, 1896. The sight of the right eye has always been weak, the left eye since schooldays. The right eye, astigmatism + 1.25 D.; V=0.3. The left eye, myopia—3 D.; V=1.0.

It seems very strange that corneal spots and astigmatism, when occurring in both eyes, act as predisposing causes to myopia, but when they appear on the one eye only they protect against this anomaly. There must, however, be some common cause for conditions so contradictory at first sight. The explanation, in my opinion, is that when astigmatism or corneal spots occur on both eyes, work is rendered difficult to them both, thus both become myopic, but when corneal spots or astigmatism affect only one eye, the normal eye works principally or exclusively, and thus becomes myopic, while the weak-sighted eye, which does not partake in the work, or at least not in the same degree, is thus protected from this change.

This seems to me very probable when I consider other cases which I have had under my care. Such a case is the following:

CASE 4.—A. T., schoolboy, 12 years old, consulted me the first time on January 27, 1892. When a little child he suffered from a considerable strabismus convergens of the right eye. The squinting had gradually decreased, but a slight convergence still remained. My examination gave as result: R. E., hyperopia of 5 D., finger in 3 to 4 metres; L. E. myopia, 1 D.; sight normal.

This patient I had the opportunity of examining several times during his schooldays. In the left eye the myopia increased up to 5 D. when the patient was 16 years old, but the right eye remained hypermetropic in about the same degree as before.

That the convergence has no decisive influence on the development of myopia is also proved, partly by the fact that persons who, when children, have lost the one eye, still may become shortsighted on the other, partly by the fact that sometimes by divergent strabismus myopia is developed on the fixing eye. As instances I herewith give some more cases:

Case 5.—A girl of 8 years was wounded in the right eye with a knife. A few days later, on June 1, 1888, when she visited me, there was a perforating wound in the cornea, hypopyon, cataract and total amaurosis. The eye was removed. The wound healed quickly, and the patient returned to her home in the country. The other eye, which seemed to be normal, was not submitted to any careful examination as to its refraction. Seven years later the patient, then 15 years old, consulted me again, as she had become shortsighted. The examination showed myopia 1.5 D. combined with astigmatism 3.5 D., V=0.7. I prescribed for work glasses correcting the astigmatism. Two years later the patient consulted me again, as she had been offered a place in an office, and was not sure whether she dared take it, having only one eye to work with. The myopia not having further increased during the two previous years, I thought she might take the place, though it was rather a hard one of eight or nine hours' writing work daily. Five months and a half later she consulted me again, the shortsightedness having increased. It was now 3 D. I prescribed atropine, but after six weeks the condition of the eye was unchanged. The patient now left her place, and occupied herself only with household work. Still her myopia continued to increase, so that at the end of another year it was 4 D. After that it remained stationary.

Case 6.—A schoolboy at the age of 17 got an iron splinter in the right eyeball. All attempts to extract the splinter with Hirschberg's magnet failed, so the eye had to be removed. The left eye had normal sight and refraction.

Two years later the patient returned, as he had begun to experience difficulty in seeing distant objects. He was now myopic 1 D. At the end of two years the myopia had increased to 2 D., and a posterior staphyloma was to be seen.

Case 7.—A schoolboy began to be shortsighted at the age of 7. Besides that he was inclined to read with only the right eye, the left eye diverging. Examination proved myopia 1.75 D. in both eyes, and a considerable muscular deficiency. Vision normal.

I ordered for the patient full correction for his myopia. Two years later the myopia was increased to 2.5 D. The left eye was still inclined to turn outwards during reading. At the end of another two years (January 8, 1897) the myopia was on the left eye as before—2.75 D.; but on the right eye it had increased to 4.5 D. On December 5, 1898, the condition was as follows: The left eye as before (—2.75), the right eye —6 D. There was binocular fixation unto 15 cm. At this point the left eye turned outwards. In the right eye a posterior stapyhloma; at the bottom of the left eye nothing abnormal.

Case 8.—A. H., schoolboy, aged 12, consulted me on August 23, 1897. A fortnight previously the right eye had been hurt by a blunt arrow. There was a large iridodialysis, and the vitreous was filled with blood. When this was absorbed the lens was found luxated in the vitreous, and a white mass extended from the disc to the yellow spot. It was 10 D. hypermetropic, and the patient could see a finger with this eye two to three metres. The left eye had normal refraction and sight. The patient returned after two years, as he had begun to experience difficulty in seeing distant objects. He was now in the left eye myopic, 1 D. The right eye was in the same state as before. On October 5, 1900, the myopia of the left eye was increased to 2.5 D. The right eye had a divergent squint. Still the myopia increased. On January 16, 1902, I noticed left eye myopic, 3.5 D.; the right eye as before, hypermetropic 10 D., with divergent strabismus.

In order to gain a more firm ground for my conclusions I have examined my notes concerning 6,000 patients in my private practice, and from this material collected 100 cases of anisometropia, either with myopia on the one eye only of

at least 2 D., or with myopia on both eyes but with a difference of refraction of 2 D. These 100 cases I have put together into five groups:

1. Myopia of the one eye, emmetropia or hypermetropia of the other, 12 cases.

2. Myopia of the one eye, corneal spots of the other, 4 cases.

3. Myopia of the one eye, convergent strabismus of the other, 1 case.

4. Myopia of both eyes, but of different degrees, 19 cases.

5. Myopia complicated with astigmatism, 64 cases.

Among these 64 cases there was astigmatism of equal degree on both eyes in 15. In the 49 remaining cases the astigmatism was confined principally or exclusively to one eye. Among these the myopia was principally or exclusively confined to the least astigmatic or emmetropic eye in 40, and only in nine cases to the astigmatic eye.

This cannot be explained according to the theory of convergence, or to any other of the common theories. Neither can it be explained by the supposition that the astigmatic eye is less susceptible to myopia, for the experience points rather to the contrary. The most probable cause seems to me to be the different acuteness of vision of both eyes by uncorrected astigmatism. The eye that is least or not at all astigmatic is usually the eye that possesses the best sight, and is therefore that which is most used in close work. The same explanation can be applied to the cases of myopia in the one eye, and corneal spots or strabismus in the other.

Time does not permit me to give an explanation how the anisometropia might be explained in all the other cases. Still I will take the opportunity to refer to one more case, that seems to be of interest, because it speaks strongly against the theory of convergence.

A lady, aged 28, visited me the first time on June 15, 1892. She was astigmatic in both eyes, —2 D., according to the rule. The left eye was myopic, 7 D. V=0.9; right eye, 1.5 D., V=0.7. The patient had always worked without glasses, and generally with the right eye shut. I prescribed for both eyes spherical, — 1.5 D., combined with cylinder —

2 D.0°, and the myopia having further increased on the left eye I advised the patient to work as much as possible with the right eye. As the glasses I had prescribed did not suit the patient, they were exchanged after five months for glasses which merely corrected the astigmatism. Ten years later (March 1, 1902) the patient returned the glasses I had prescribed; she had constantly used them while reading, etc., keeping the left or most shortsighted eye shut. On examination I found myopia unchanged in the left eye, but in the right—less myopic eye—shortsightedness had increased from — 1.5 to — 4 D.

As to the opinion that convergence would lead to myopia by causing a strain on the optic nerves at the posterior pole of the eyeball I have measured the punctum proximum of convergence in all cases of myopia in my private practice during the latter years. The method I have employed is based on the same principle as those used by Priestley Smith, Maddox, Hirschberg, and Gullstrand for other purposes, namely, the different position of the corneal reflex when the eye is fixing a flame or when it is deviating.

The little instrument I have used has the form of a little rectangular wooden hook, with a small hole just at the angle. A lighted wax match is put in the hole, and the instrument is advanced to the patient's fixing eyes, gliding on a metre scale, which leans against his cheek. As soon as the one eye deviated outwards, the corneal reflex seemed to glide inwards. The distance when this takes place can immediately be measured on the metre scale. The result of my investigations has been that, out of 100 cases of myopia, there were 81 who at least converged 5 cm., and among these were cases of myopia up to 18 D.

This speaks in its way against the theory of convergence, for it is very probable that a strain on the optic nerves at the usual distance for reading (or about 30 cm.) would be produced if the eyes are able to converge to 4 to 5 cm.

The direction of the posterior staphyloma also seems to me to speak against the theory of convergence. When the eyes in reading, etc., are turned downwards and inwards, the strain at the posterior poles must make itself felt outwards and upwards. But the direction of the posterior staphyloma is commonly outwards and downwards.

On the ground of these observations, I think I may enunciate the following thesis:

If by any cause the sight of the one eye is weakened in early childhood, myopia is developed exclusively or principally on the other (strong) eye, whether the first-named takes part in fixation or passes on to convergent or divergent strabismus. If one of the eyes is lost a typical myopia may be developed in the remaining eye.

Convergence equally with accommodation is, therefore, not one of the most important factors in the origin of myopia, for the myopia can arise independently of all convergence. The chief cause of myopia is "seeing" in a limited sense; the perception in the yellow spot and the processes connected therewith at the posterior pole of the eye. What these processes may be is not easily decided. But it seems to me not impossible that the effort of discerning the objects quickly following on each other—as, for instance, the letters in writing or reading—might lead to the hyperæmia at the bottom of the eye, which some theories assume as a predisposing cause of the myopic changes at the posterior pole of the eye.

Accumulated products of fatigue may also have a deleterious influence on the membranes. Hyperæmia on its side may lead to softening of the tissues which yield to the intraocular pressure. In more advanced cases the hyperæmia and the products of fatigue may lead to more serious changes of an inflammatory or atrophic character.

If the opinions here expressed are right they have undoubtedly practical importance. The school myopia is to be prevented only by facilitating the work of the retina. All measures which have another aim are more or less unimportant.

I will, however, by no means deny all importance of convergence. On the contrary, I am always very careful in my practice to facilitate the convergence by means of corrective glasses for myopic patients, specially in cases of muscular insufficiency. But I think that glasses are useful not by lessening the pressure of the muscles on the eyeball or on any of the vortex veins, or by lessening the strain on the optic nerves at the posterior pole of the eye, but chiefly by facilitating binocular fixation and thus contributing to a clear

image of the fixed object in the central fovea. Moreover, correcting glasses improve the position of the body during work at school, and extend the distance for accommodation. Thus I generally give myopic patients fully correcting glasses if accommodation and acuteness of vision are good. Still I cannot find that an artificial emmetropia, effected by correcting glasses for the same eyes which the natural emmetropia has not been able to prevent from becoming shortsighted, should entail the strong protection against progressive myopia which from many quarters has been contended.

DISCUSSION.

Mr. Maddox called attention to the difficulty of applying the laws of probability to this subject without the possession of statistics from uncivilized countries as well as from the civilized. The fact that Mr. Wray found it necessary to exclude blood relations in collecting statistics was a concession to the hereditary tendency in families. His tables showed very clearly and beautifully that while hypermetropia obeyed the laws of probability, myopia did not. This proved the presence of some disturbing influence, and confirmed the impression that bad educational methods played a large part in deepening myopia when once it had begun. It also lent weight to a suggestion which he had made that in the interests of the nation (for undoubtedly a shortsighted nation was inferior to a more nearly emmetropic one) the children of shortsighted parents should be tested under atropine, so as to discover which of them inherited a tendency to short sight, as evidenced by the possession of less juvenile hypermetropia than they should have, with a view to prevent the onset of the defect by modifying educational strain.

Colonel E. F. Drake-Brockman said that in 1869 he was appointed to the Ophthalmic Hospital in Madras. At that time myopia among the natives who applied to the hospital was exceedingly small, and at the same time education was also of an inferior standard. As time went on education became better and standards higher, and in proportion the number of myopes applying at the hospital increased. He concluded that civilization in the direction of advanced edution was one of the chief causes in the increase of myopia among the natives of India.

Dr. Hill Griffith doubted if hypermetropia ever became less as years went on, and certainly he had never seen myopia supervene on hypermetropia. One writer warned them from fully correcting hypermetropia in case the development of the eye was hindered. One would have expected myopia to be very common in India, where for centuries education was in advance of that in Europe.

Mr. Doyne was astonished to hear what Dr. Hill Griffith said. He had seen dozens of cases in which hypermetropia had diminished. He also thought that if full correction were not ordered there was often a tendency to the diminution of hypermetropia.

Mr. Story (Dublin) doubted if myopia had really so much increased in modern times as was generally believed. In former times people did not seek aid for defective sight so assiduously as they did now.

Dr. McGillivray had seen a few cases of slight hypermetropia pass into slight myopia. In one case he had seen a change of 4 D.

Dr. Hern said that his experience was that hypermetropia of low degree did not tend to alter, but in high degrees it did get less as time went on. He did not remember a single case in which hypermetropia became myopia when his first observations were made with the eyes under the influence of atropine.

Mr. Holmes Spicer had met with cases occasionally in which hypermetropic eyes had become less hypermetropic' and with some which had passed from the hypermetropic to the myopic side, but the change in refraction had never been very great. With regard to Professor Widmark's paper, they were greatly indebted to him for his views on myopia, as they gave them a new point of view and a new direction to work in. He did not accept his views because he was firmly convinced of the truth of the convergence theory of myopia and of its value as directing treatment. As to Professor Widmark's statement as to the development of myopia in the good eye where the other cornea was nebulous, it was not so in his experience, and he had not met generally with the development of myopia in an eye in which its fellow had been excised in infancy.

MEDICAL SOCIETIES.

PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.*

W. Lang, F.R.C.S., Senior Vice-President, in the Chair.

Clinical Evening.

Thursday, December 11, 1902.

Death of the President.

Before commencing the business of the evening, Mr. Lang said: "It is my mournful duty to announce to you the great loss this Society has sustained through the death of its President, Dr. David Little, at the age of 62. It will be the wish of all of us to convey to Mrs. Little and her family our deep and heartfelt sympathy in the irreparable loss she has sustained—a loss which we as a Society feel most keenly. It was only a year ago that he, apparently in his usual health, delivered that admirable presidential address which appears in the recent volume of our *Transactions*. It is an address characteristic of the man who was modest, calm, shrewd, decided, and eminently practical. In it he says: 'To be awarded by my professional colleagues the highest office in their gift is indeed a distinction of which any one may be proud,' The remainder of the address showed that Dr. Little was a good observer, who could carry theory into practice in a most successful manner, as evidenced by the good results of his operations. His reputation as a successful ophthalmic surgeon in the North of England was deservedly great, and as an operator he was second to none. His kind, quiet and gentle manner endeared him to his patients, and to all he was a loyal and true friend. We mourn with Mrs. Little and her family, and I am sure it is your wish that a vote of condolence and sympathy should be sent to her from us."

Cases.

The following were shown:

By Mr. Stephen Mayou: A case of contracted pupils undilatable to a mydriatic. The patient, a child, showed ob-

*British Medical Journal.

vious signs of congenital syphilis, and the knee-jerks were absent.

Mr. Sydney Stephenson said that although the pupils did not react to light, yet they did to accommodation, and this, taken in conjunction with the other symptoms, induced him to believe that the case was one of commencing tabes.

Dr. F. W. Edridge-Green gave demonstrations of (*a*) classification test for color blindness, and (*b*) lantern test for color blindness. The former consisted of colored wools, silk, cards, and glass, whereby it was impossible that a color-blind person could by contrast tell correctly the colors. The lantern consisted of an ordinary tin box like an optical lantern, in which, instead of the lens, was substituted various colored glasses which could be used alone or in combination so as to test the color vision in the same way that an engine driver on a railway or a "look-out" in a ship would have to see and interpret the colors.

Mr. Adams Frost thought that a committee should be formed with a view of testing and reporting on patients with defective color vision when using Dr. Edridge-Green's tests.

Mr. Breuer thought that Dr. Edridge-Green's tests were inefficient, and that no one test was convincing.

Mr. Charles Blair and Dr. Bernard Potter showed two cases of aniridia and one of coloboma of the iris in the same family.

Mr. Blair also showed some zonular or ribbon-shaped opacity of the cornea.

Mr. E. E. Maddox showed (*a*) an eye heater; (*b*) a new regulating transformer; and (*c*) a lamp resistance. The eye heater consisted of a coil of thin tinned wire sewn into flannel, which could be placed in an eye dressing, and by means of the regulating transformer could be put into contact with the current from the electric main. In this way the heat could be regulated to a nicety, and if a fuse wire were placed in the circuit there was no possibility of overheating, and the temperature could be kept for any length of time constant.

Mr. Sydney Stephenson exhibited several patients whose cornea had become stained by the long-continued application of sulphate of copper to the lids for the cure of trachoma. The opacity covered the central part of the cornea, and was

accentuated towards the upper and lower margin, so as to form two crescents of a rusty greenish color. Pieces removed from the affected cornea by scraping gave some of the characteristic chemical reactions of copper.

Mr. Lang thought that possibly a corneal microscope might show the crystalline deposit. He had seen a fluorescent appearance of the cornea after the use of quinine lotion.

Mr. Stephenson, however, thought the deposit was not of a crystalline nature.

Mr. N. C. Ridley showed a child with congenital anophthalmos and a case of embolism of the central artery of the retina in a young girl, which followed a fright.

Mr. E. Treacher Collins a case of atrophy of the optic nerves caused by lightning, as it also caused deafness he thought it due to an electrolytic action.

Mr. Arnold Lawson showed a case of bitemporal hemiopia from acromegaly. Since taking pituitary gland the left field and vision had much improved, but during the same period the right, which was originally the better eye, had undergone further degeneration of sight and field.

Mr. Doyne had seen two cases in which pituitary gland had done no good to the vision in cases of acromegaly.

Mr. Lawson's second case was an unusual form of retino-choroidal change, the result of hæmorrhage.

Mr. Lang mentioned a case he had once seen similar to Mr. Lawson's, in which the same sort of appearance was really due to a spreading sarcoma.

Mr. Jessop thought the appearance was rather suggestive of tubercle.

Mr. W. H. H. Jessop: A case of optic neuritis with peculiar retinal changes, probably physiological in nature.

Dr. F. E. Batten: A case of cerebral degeneration with changes at the macula. The child was seven years of age and was becoming an idiot.

Dr. Rayner Batten showed drawings of similar cases.

A DISCUSSION ON THE RARER FORMS OF OPTIC ATROPHY.*

Read at the Meeting of the British Medical Association, Section of Ophthalmology.

Dr. James Taylor would exclude from the discussion, except for purposes of comparison, atrophy following neuritis, the atrophy following neuritis the result of intracranial growth, and atrophy (primary) resulting from tabes or general paralysis. At the same time, in emphasizing the importance of recognizing the frequent occurrence of optic atrophy in general paralysis, a fact made clear by Dr. Mott's experience at Claybury, he had made necropsies on several cases of general paralysis in whom the mental symptoms had been present but a short time, although they had been blind in some instances for a considerable number of years. It was also to be recognized that optic atrophy was not an uncommon result of the neuro-retinitis occurring in Bright's disease, and also in glaucoma and of injuries to the optic nerves. He referred first to the large class of cases of optic atrophy associated with disseminated sclerosis. These he believed were in most cases the result of a neuritis, usually retrobulbar in position, but in some cases obvious on account of redness and slight swelling of the disc. In some a central scotoma for color was present; the pallor in these was slightly different from those in tabetic cases, and the vessels were not so small. One very striking difference also was that in the vast majority of cases of atrophy in tabes the visual impairment went slowly but surely on to cause complete blindness. He had never seen complete blindness occur in any of the numerous cases of disseminated sclerosis which he had observed; in fact, one was often much surprised at the very fair vision which coexisted with extreme pallor of the discs. Dr. Taylor next referred to cases of toxic amblyopia and the atrophy which frequently accompanied it. He mentioned the small amount of tobacco which might cause amblyopia if sugar were present in the urine, and to one patient who had glycosuria and central scotoma who had not smoked or used tobacco for twenty years. He asked what it was which in some cases of amblyopia prevented recovery,

*British Medical Journal.

and was the atrophy in these more likely to be a progressive one? He next referred to cases of atrophy not preceded by neuritis occurring as by pressure on the chiasma, and referred to the frequency in which such cases came under observation with one eye already blind while the other had the temporal field blind. Dr. Taylor also referred to a case of optic atrophy which he had seen in a case of ordinary left hemiplegia in which there was no hemianopsia, and to two cases of optic atrophy in young men, the reasons for which were obscure.

Mr. Holmes Spicer said that in the atrophy accompanying disseminated sclerosis he had found that the loss of sight was central—a central scotoma—so that although there was not much reduction of the size of the fields, yet there was great impairment of sight. He had always regarded these cases as being caused by an island of sclerosis somewhere in the optic nerve behind the eye. He believed that these cases did not, as a rule, progress to a complete loss of visual fields. As to the question of tobacco amblyopia, the possible fallacy always lay in the tendency of smokers to conceal the fact of their continued habit, and to tell untruths about it. There was no doubt that central amblyopia did occur in diabetes, but the cases on record in which there was no possibility of tobacco were few, and, in fact, diabetics were more liable to be affected with tobacco amblyopia than were healthy subjects. He had published a case of primary optic atrophy in a boy affected with diabetes insipidus in which there was no question as to the use of tobacco, and the loss of vision was not of the central scotoma type but a primary atrophy resembling that of tabes. Many of the isolated cases without obvious cause, of which Dr. Taylor had spoken, probably belonged to the hereditary group. Cases of Leber's disease sometimes appeared isolated because they were unacquainted with the whole family history.

Dr. Emyrs-Jones asked Dr. Taylor if he had come across any cases associated with dropping of fluid from the nose. He had reported such a case fifteen years ago in the *Ophthalmic Review;* both optic nerves were quite atrophic. The patient had since died, but no necropsy was allowed. He had not seen another case. He quite agreed with Mr. Spicer as to the difficulty of getting smokers to tell the truth concerning

the use of tobacco, which was a very important factor in the production of atrophy.

Dr. Hawthorne regarded it as of the first importance to recollect that clinically optic nerve atrophy was not a fact but an inference. The diagnosis might in certain circumstances be a very confident one, but after all it was a diagnosis and not the statement of an observed fact. The evidence on which it rested was obtained from three different sources, namely, the state of visual acuity, the characters of the optic disc, and the condition of the visual fields. Possibly in the majority of cases, certainly in a large proportion, these three sources of evidence were equal contributors. The visual acuity was reduced, the disc was extremely white, and the visual field was contracted. But this was not invariably the case. In the first place the disc might be quite justifiably described as "white," and yet the vision and visual fields be normal, and in these circumstances he, for his part, regarded a diagnosis of optic atrophy as altogether in advance of the facts. Again, the test of types might show a full measure of vision, and yet the state of the field and the condition of the disc be such as to place the diagnosis beyond dispute. Opposed to this were cases with a white disc, great reduction of the visual acuity, and yet a full peripheral field, at least for white. With this there might or might not be a central scotoma, but complete loss of the power to appreciate color in any part of the field was common. Further, it was possible to have a disc presenting no abnormal features to ophthalmoscopic examination, to find a normal standard of vision, and yet with these to detect a considerable loss in the visual field. Such a combination Dr. Hawthorne had observed in a patient having Argyll-Robertson pupils, loss of the knee-jerks, and a zone of anæsthesia round the trunk, and in these circumstances a diagnosis of optic atrophy with tabes dorsalis seemed unavoidable. There were other considerations that might be discussed, but what he wished to urge was that every case of optic atrophy should be studied as bearing on the visual acuity and visual fields (both for white and colors) as well as in relation to the ophthalmoscopic appearances of the disc. Possibly in this way a collection of facts might be obtained which would throw some light on a

region in which at present there was much uncertainty. What was wanted was not merely the statement of optic atrophy as a fact but the presentation of the evidence on which this conclusion was grounded. In this way different forms of atrophy might be classified if not explained. So far as the specific instances quoted by Dr. Taylor went, he agreed generally with the distinctions drawn between the atrophy that accompanies tabes dorsalis and that sometimes found in disseminated sclerosis. He was strongly disposed to believe that an amblyopia having the features usually credited to tobacco poisoning also occurred apart from tobacco. He had seen a central scotoma in diabetes mellitus quite apart from anything like over-use of tobacco, and he thought that a similar condition had been recorded where no question of tobacco could arise, namely, in young patients with diabetes insipidus, instances of which had been described by Mr. Holmes Spicer and Mr. Work Dodd. When all had been said there remained cases of optic atrophy which seemed beyond explanation, but this rendered the claim for a systematic study of the condition all the more urgent. That study, if it were to be fruitful, must be based on something more than opinions regarding the appearance of the optic disc.

Dr. Bronner quite agreed with Dr. Taylor that in many cases diagnosed as tobacco amblyopia the impaired vision was due to other causes. Many were due to commencing central retinal and choroidal changes, which disappeared on the use of potassium iodide. It was important in all cases of optic atrophy to take the field of vision for color as well as for white. In many cases of so-called tobacco amblyopia the field of vision was not contracted for white, but only for colors.

Dr. Newton Pitt said that the pathological condition found was not well known, for few if any cases had been examined histologically in which the fields had been accurately taken during life.

Dr. Lodge thought that the case mentioned by Dr. Hawthorne, in which there was normal vision with limitation of the field and a zone of anæsthesia round the trunk was one of syringomyelia, in which vasomotor disturbances were the cause of the eye symptoms. Atrophy from tobacco rarely

came on before 40, but there were numerous cases in which tobacco might be fairly excluded occurring in people from 16 to 30 in which the origin was most doubtful. He mentioned several cases in which this occurred.

Mr. Parsons called attention to the tendency to put the lesion in all these cases in the optic nerve itself. In many of them it was probably in the retina, and the evidence in favor of this in tobacco amblyopia was increasing rapidly. Attention was especially directed to the work of Birch-Hirschfeld on the subject.

Mr. Bishop Harman said he had for some time been unable to accept the current views of the pathology of optic atrophy in retrobulbar neuritis, etc.; he believed it to be based upon an inaccurate appreciation of the ascertained facts of the development of the nervous connections of the eye, and of the theory of the neuron. The retina was known to arise as an outgrowth from the brain; within this outgrowth nerve cells gave rise to axons which grew centrally to make connections with parts of the brain different from the site of origin of the evagination. Thus the trophic centres of the optic nerve fibres were the ganglion cells of the retina from which they were outgrowths. The case was parallel with the relation of a posterior root ganglion cell to its central axon passing into the cord. Thus degeneration of the optic fibres should be in the vast majority of cases ascending only, and we should look in cases of optic atrophy first to the retina for evidence of damage. He believed a rational classification could be arrived at as follows: (1) Primary damage in disease of the ganglion cells (*a*) from anæmia due to spasm of retinal vessels from drugs as quinine, reflexly from cold, and to general anæmia succeeding severe hæmorrhages, febrile diseases, etc.; (*b*) from poisoning of the ganglion cells by drugs—tobacco, lead—a view directly supported in the antidote of tobacco blindness, strychnine, which was agreed to act directly upon nerve cells. In all these cases the changes at the disc would be proportionate to the number of cells damaged; in cases of great loss of ganglion cells, it was probable the rapid destruction and swelling of the myelin sheaths of the degenerating fibres at the lamina cribrosa produced a mechanical choked disc. (2) Cases of damage to

the optic nerve by contiguity of diseased structures or in general nerve changes producing islands of fibroid exaggeration, and followed by obvious atrophy of the disc. Here ascending degeneration should be the earlier result, with a later degeneration of the axon segment next the trophic ganglion cell from disuse, a process the more easy owing to the special myelin sheathing of the optic nerve fibres. In reply to a question by Dr. McGillivray (Dundee) as to how he could explain by ascending degeneration undoubted optic atrophy following section of the nerve in fracture at the optic foramen, Mr. Harman said in these cases there was nothing to show the damage was limited to the actual point of injury, exudation was just as certainly to be found within and around the optic sheath even to the disc, which would explain the early onset of atrophy in some cases; further, he allowed the possibility of a degeneration of the segment between injury and trophic cell, both from disuse and by reason of the arrangement of the myelin sheaths of the optic fibres.

Dr. Hill Griffith found difficulty in explaining those cases in which atrophy followed copious hæmorrhage. The largest class of all was that in which no satisfactory cause could be assigned. Women were much more susceptible to the influence of tobacco than men; they developed tobacco amblyopia sooner and with less tobacco.

PAMPHLETS RECEIVED.

"Tinnitus Aurium," by G. G. Lewis, M.D.

"Chancre of the Tonsils," by W. Cheatham, M.D.

"Visual Tests for Children," by A. E. Ewing, M.D.

"A Series of Mastoid Operations," by G. F. Fiske, M.D.

"Enormous Naso-Pharyngeal Soft Fibroma," by C. R. Holmes, M.D.

"Post-operative Management of Intra-Nasal Surgery," by M. A. Goldstein, M.D.

"Exercises in the Surgical Anatomy of the Temporal Bone," by S. Spencer, M.D.

"Juvenile Cataract with Especial Reference to the Lamellar Form; with Report of Cases," by F. Alter, M.D.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

THE POST-OPERATIVE HISTORY OF FIFTY CASES OF SIMPLE CHRONIC GLAUCOMA.

Charles Stedman Bull, in a paper read before the American Ophthalmological Society, July 16, reports the results of ninety-four iridectomies, broad and peripheral, performed on fifty patients, ranging in age from twenty-six to eighty-four years, all suffering from simple, non-inflammatory chronic glaucoma, showing increased tension, narrowing of the visual field, especially on nasal side, and impairment of vision. Iridectomy was done on one eye alone in six cases, on both eyes simultaneously in thirteen cases and on both eyes at varying intervals of time, in thirty-one cases.

The cases were under observation from one to twenty years. As to central vision, a temporary improvement was noted in seven eyes, a permanent improvement in thirty-seven, and immediate failure of central vision in two (eyes with telescopic fields). In twenty-four eyes the vision that existed before operation was retained as follows: In one eye for two years, in seven for three years, in three for four years, in one for five years, in seven for eight years, in two for twelve years, and in two for eighteen years.

The author found that "the best results as to ultimate vision occurred in the cases in which the central vision was the best and the fields were the least encroached upon at the time of operation, or, in other words, as soon as the existence of the disease was definitely established."

And "that where the disease undoubtedly exists in both eyes of a patient better results as to visual acuity and the field of vision are obtained by a simultaneous operation on the two eyes."

SCHOOL HYGIENE OF THE EYE.

J. W. Sherer (*St. Louis Medical Review*, Dec. 6) emphasizes the importance of examining the eyes of every pupil before systematic study is undertaken in order to discover and correct any defect of vision that may exist. The other

important points that should claim our attention are: (1) Light; (2) the position of the body during the hours of study; (3) amount of near work to be done; (4) type used in school books.

Light should come from above and to the left: there should be sufficient illumination to enable an eye with normal acuteness of vision to read diamond type at 14 inches in the darkest part of the room on gloomy days.

The author agrees with Risley, who favors a southern exposure (rather than Norris, who favors a northern), because he believes that every apartment that is regularly occupied should be flooded with sunshine. When artificial light is necessary he prefers the electric incandescent lamp enclosed in a lightly-frosted globe which conceals the film, and produces a diffuse light.

As to desks, the adjustable variety should be used as well as an adjustable seat. Both should be adjusted so that the pupils feet rest comfortably on the floor and the arms on the desk, without elevating the shoulders or leaning forward.

As to the amount of near work to be done, the author makes a plea for as frequent intervals of relaxation as the nature of the study will allow, the younger the pupil the more consideration he should be shown. Home study for younger children is deprecated. The type of school books should be large, well spaced and the lines leaded.

OBSERVATIONS UPON RECENT METHODS OF TREATING CORNEAL ULCERS. WITH ESPECIAL REFERENCE TO THE USE OF CARBOLIC ACID AS A NOT INFREQUENT SUBSTITUTE FOR THE ACTUAL CAUTERY.

Samuel Theobald (*American Journal of the Medical Sciences*, June) believes that in many cases of corneal ulcer where the cautery is usually employed carbolic acid may be substituted with advantage. He does not claim that it will accomplish, in every case, what the cautery will, but recommends that it be given a trial in most cases before resorting to the galvano- or thermic cautery, as it is a much simpler procedure and less dangerous. As to its application, the author says:

In applying pure carbolic acid to the cornea it is, of course, important to limit its action carefully to the affected

part. To facilitate this the eye should be anæsthetized by cocaine, which renders the procedure entirely painless. I have found it convenient to make the application by means of a pointed toothpick, about the tip of which a very small quantity of absorbent cotton has been wound. If much cotton is used an excess of the acid will be taken up, and it will be almost impossible to prevent its spreading over healthy portions of the cornea. To the surface of the ulcer the acid should be thoroughly applied by a gentle rubbing movement, which is, in effect, a sort of curettage. When the ulcer is foul and its walls are lined by infected and necrotic material, this should be removed with a small curette before the acid is applied. When, however, this condition is less pronounced, aided by the loosening action of the cocaine, the cleaning of the ulcer may be affected satisfactorily by means of the toothpick, armed with a wisp of dry cotton. After the acid has been allowed to remain in contact with the ulcer for a few moments, the lids meantime having been held apart, its further action should be arrested by flushing the cornea with sterile water, normal salt solution, or a saturated solution of boric acid.

CAUSES OF PRIMARY GLAUCOMA.

George Levinsohn (*Berliner Klinische Wochenschrift*, October 20) thinks an increase of connective tissue in the ciliary body is, in the vast majority of cases, the cause of primary glaucoma.

The enlarged ciliary body presses upon the iris, pushing it forward, lessening the depth of the anterior chamber, and to a greater or less extent obliterates Fontana's space. The pushing forward of the iris dilates the pupil which assists in obstructing the canal of Schlemm. The author submits specimens in support of his theory.

THE EYES OF SCHOOL CHILDREN IN NEW YORK.

As the result of examining 55,000 children, in thirty-six public schools, last year, the Health Commissioner of the city of New York found 12 per cent. suffering from contagious diseases of the eyes. In order to permit the attendance of such children, ophthalmic surgeons have been appointed to make routine examination of the eyes of all applicants.

THE TREATMENT OF CORNEAL INFILTRATIONS BY IODINE-VASOGEN.

On account of the severe and prolonged pain produced by the tincture of iodine when applied to corneal ulcers, and on account of the difficulty of limiting the effect of carbolic acid, the author concluded to try Lehn and Fink's iodine-vasogen (in 10 per cent. solution) in this class of cases.

Twelve of the nineteen cases referred to were followed from start to finish. All were ulcers, and the results of the treatment was favorable from the start; the first application stopping the progress of the disease, and after several more applications a distinct improvement was noticed; the exudate absorbing and the ulcer healing promptly.

His conclusions are:

1. Iodine-vasogen is a valuable application in infiltrated and spreading ulcers of the cornea, whether associated with purulent conjunctivitis or not.

It is particularly indicated in those cases in which the galvano-cautery is contra-indicated by the situation of the infiltrate.

2. It rarely causes pain, if not applied in excess, and never causes any unpleasant reaction or untoward effects.

3. Preliminary anæsthetization of the cornea with cocaine is rarely required, and in general is better omitted.

4. The application is best made every other day until the infiltrate begins to shrink decidedly, and then should be made every three or four days until the infiltrate disappears.

LOWERED BLOOD-PRESSURE AS THE CAUSE OF GLAUCOMA.

In a recent paper read before the French Ophthalmologic Society, Zimmerman (*Revue générale d' Ophthalmologie*, September 20, 1901) advanced the theory that decrease in blood-pressure, from mental or physical shock, cardiac disease, etc., is a prominent factor in the etiology of glaucoma, and in his explanation he utilizes both the theory of defective excretion and that of excessive secretion. When vascular pressure is lowered, even though intraocular tension is normal, the blood enters the eye only with difficulty, and pulsation of the intraocular arteries is noticed. Diminished intraocular supply causes denutritional changes and edema, with actual increase of intraocular tension. The sclera becomes distended, the

intraocular veins are compressed, general edema of the inner tunics results, and the gross changes typical of glaucoma occur. Zimmerman believes that in certain cases in which intraocular tension does not rise above normal, glaucoma may develop from a relatively low vascular pressure, the result of profound and persistent cardiac disturbance. He also says that prodromal glaucomatous attacks do not necessarily indicate ocular disease. The eye may at first be healthy, but the blood-pressure greatly lowered. True glaucoma does not develop until repeated prodromal phenomena have produced such anatomic changes as cupping of the disc and closure of the filtration angle.

The practical application of these observations is that in simple glaucoma the treatment should include, primarily, measures to increase and maintain the proper blood-pressure. In 40 cases of subacute glaucoma so treated, Zimmerman had need to resort to iridectomy but once. As to the drugs employed, digitalis was found unsuitable on account of certain mydriatic effects. Strophanthus acting upon the heart muscle rather than upon the blood vessels was very satisfactsry, administered in doses of eight minims four times daily. Adonis vernalis was found equally effective.

This treatment, of course, is not indicated in secondary glaucoma following disease, injury, or operation, as here intraocular pressure is the primal cause, and the arterial pressure may not be disturbed.—*American Medicine.*

PAMPHLETS RECEIVED.

"Weight and Diet in Pulmonary Tuberculosis," by J. F. Russell, M.D.

Empyema of the Frontal Sinus; Some Observations on Its Treatment," by G. L. Richards, M.D.

"Jacques Daviel and the Beginning of the Modern Operation of Extraction of Cataract," by A. A. Hubbell, M.D.

"Address on an Exhibit of Early (prior to 1860) British and American Ophthalmic Literature," by C. A. Wood, M.D.

"A Case of Meninigitis from Extension of Acute Purulent Otitis Media Through Osteomeyelitis of the Petrous Bone," by A. Knapp, M.D.

BOOK REVIEWS.

Biographic Clinics. The Origin of Ill-Health of De Quincy, Carlyle, Darwin, Huxley and Browning. By G. M. Gould, M.D. [Philadelphia: P. Blakiston's Son & Co. 1903. Price, $1.00].

The learned author of this very interesting book shows that an error of refraction unrecognized or uncorrected may have a decided influence on the general health, and consequently on the character of the individual. The biographies of the five great minds selected by the author plainly show the ill effects which might have been remedied by means of glasses. This is most interesting reading and should be carefully studied by physicians as well as the general public.

In additional chapters the meaningless term of biliousness is discussed; then astigmatism and eye-strain and kindred subjects. All of this is clearly and simply expounded, and will prove most satisfactory reading to all. Alt.

PAMPHLETS RECEIVED.

"Cancer of the Larynx Cured by X-Rays," by W. Schepegrell, M.D.

"A Peculiar Form of Persistent Pupillary Membrane," by A. Duane, M.D.

"The Treatment of Corneal Infiltration by Iodine-Vasogen," by A. Duane, M.D.

"Some Considerations of the Hygienic and Prophylactic Treatment of Myopia," by A. Duane, M.D.

"Reflections on Some of the Purposes and Work of the New York State Medical Association," by A. A. Hubbell, M.D.

"Simultaneous Paretic Mydriasis, Subluxation of the Lens, and Rupture of the Choroid, with Marked Involvement of the Retina," by A. Duane, M.D.

"Chronic Suppurative Otitis Media. When Should Radical Surgery be Employed in Its Treatment, and of What Should It Consist?" by G. L. Richards, M.D.

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ORIGINAL ARTICLES.

AN OPERATION FOR ATROPHIC (CICATRICIAL) ENTROPIUM OF THE LOWER EYELID.

By ARTHUR E. EWING, M.D.,

ST. LOUIS, MO.

At the annual meeting of the American Ophthalmological Society in 1900, I described a method of operating for atrophic entropium of the lower eyelid, which had yielded exceptionally fine, and as subsequent observation has shown, permanent results. The operation, as described, was a development of the operation devised thirty years ago by Dr. John Green for cicatricial (atrophic) entropium of the upper eyelid. The essential feature in this operation is a longitudinal incision through the tarsal conjunctiva and the tarsus, parallel to and from two to three millimetres distant from the line of the openings of the Meibomian glands. This incision, extending through the entire thickness of the tarsal tissue from its nasal to its temporal end, permits the whole marginal strip to be turned forward, to form a new lid margin of normal width and appearance; the gaping cut on the conjunctival aspect of the lid becomes filled with new tissue by which the height of the tarsus is permanently increased, often as much as two or three millimetres.

In the case of the lower lid the operation leaves much to be desired, owing to the very great difficulty in keeping the tarsal incision widely open during the progress of the healing. To obviate this difficulty I devised the plan of dissecting the tarsal conjunctiva from the tarsus, from a little behind the openings of the Meibomian glands in a width of about five millimetres, and stitching the loosened conjunctiva into the bottom of the tarsal incision. Since reporting my procedure in 1900, I have made several improvements in the way of simplifying the operative technique, and in the manner of inserting the sutures.

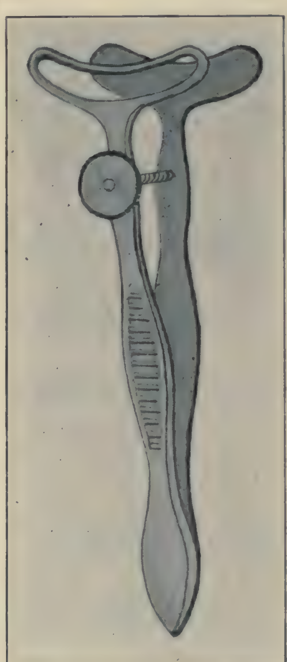

FIG. 1.

As an aid in everting the lower lid I employ a modification of the *pince anneau* of Desmarres, as shown in Figs. 1 and 2. The two blades are either flat or slightly curved in a direction opposite to that of the instrument of Desmarres; also the distal ends are modeled to the curvature of the lid margin. In applying the forceps the spatula blade is set against the dermal surface of the lower lid near the line of the cilia, and moderate pressure is made downwards and back-

wards. This everts the lid so that the fenestrated blade may be made to engage the conjunctival surface at the distance from the lid margin intended for the tarsal incision, usually two to two and one-half millimetres, as indicated by the dotted line in Fig. 2. The screw may then be tightened, or

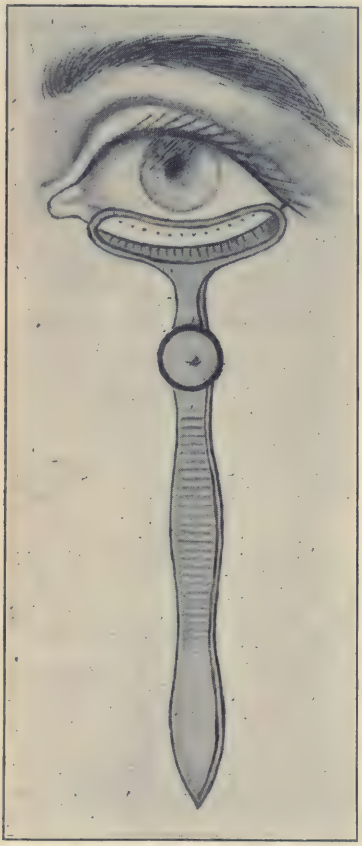

FIG. 2.

the forceps may be held firmly in position, while making the incision, which should be the full length of the lid and parallel with its margin. Care must be exercised not to cut entirely through the lid, and not to place the incision too far from its margin. In the latter case an excessive eversion might result. If, upon examination, the incision is found to be incomplete, it may be finished with a Graefe knife or a small bistoury. To do this easily and thoroughly the forceps may be removed, the blades closed with the fenestrated blade

upward, and (thus closed) again placed against the lid as was done with the spatula blade in the beginning. The margin of the lid is in this way rolled forward over the wire of the fenestrated blade, and, with the spatula blade serving as a support, the incision may be followed and deepened. It should be carried through the tarsus and underlying fascia, down to or a little into the muscular layer of the orbicularis, as shown in Figs. 3, 4 and 5, so that the muscle is exposed throughout the entire length of the wound.

FIG. 3.

FIG. 4.

After the incision of the tarsus has been completed the partially detached marginal strip may be turned forward by means of toothed forceps, but with less injury to the tissues and more effectually by inserting either a single thread near its centre, or two or three threads, as indicated by *a*, Figs. 4 and 5. By pulling forwards upon these threads the incision

is drawn widely open, exposing the muscular layer and permitting the accurate placing of the sutures, *b*, Figs. 5 and 6.

FIG. 5.

FIG. 6.

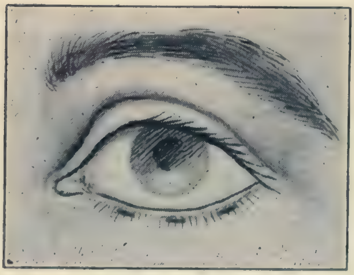

FIG. 7.

These sutures, generally three in number, Fig. 7, are passed through the conjunctival edge of the cut, in the standing portion of the tarsus, and then through the marginal strip, being

entered at the bottom of the wound between the muscle and the detached cartilage, to emerge on the dermal surface in or a very little below the line of the cilia. The needle is then re-entered through the skin in the same horizontal line, about three millimetres distant from the first point of exit, and the suture is tied in the conjunctival incision, Fig. 6.* Should any part of the orbicularis muscle remain exposed, it should be covered by inserting intermediate sutures connecting the conjunctival edge of the standing portion of the tarsus with the bottom of the wound. The effect of the principal sutures, when drawn moderately tight, is to evert completely the entire marginal strip, as shown in Fig. 6. The cuticular surface of this strip, which had been previously turned against the eyeball, is brought again into its proper anatomical position, to form anew a palpebral margin of normal width and with a normally defined posterior angle. The exposed tarsus becomes covered with epithelium, to form a conjunctival surface continuous with that of the standing portion of the eyelid. For the sutures, fine silk (No. 1) carried by fine needles is used. Both should be thoroughly sterilized. After completing the operation the eye should be cleansed with a one-to-five-thousand corrosive sublimate solution, and bandaged. The following day it should be inspected, again cleansed with the sublimate solution and bandaged, and this should be continued daily until the sutures are removed, usually after from three to five days.

My first experience with this simplified method of operating dates back about eleven months, having been first tried in a case in which it proved impracticable to dissect up a conjunctival flap from the tarsus as described in my former paper. The result was in all respects perfect, and it has remained permanent. In two other cases a somewhat broad strip of skin had been previously removed by an operator in another city, apparently without the slightest beneficial effect. In a fourth case, in which the entropium had followed a burn of the conjunctiva and in which a previous incision of

*In placing these sutures I have also used a thread armed with two needles, tying the knot against the skin; the method described in the text has proved more satisfactory, as effecting a more perfect eversion of the lid-margin.

the tarsus combined with the excision of a strip of skin had proved ineffective, the operation was confined to the nasal half of the eyelid, and four principal sutures were inserted. In all four cases there is now an ideal lid margin, with restitution of the cilia to a normal position and direction; in no case has there appeared to be any tendency to relapse. In one case, in which only three principal sutures were employed, there was a slight superficial necrosis of the exposed tarsal tissue, which, however, did not at all impair the final result.

I have also operated by this method on the upper lid with uniformly excellent success.

Note by Dr. John Green:—The longitudinal incision of the conjunctiva and tarsus, as a fundamental procedure in operating for organic inversion of the margin of the upper eyelid, suggested itself to the writer as an improvement on the *tarsotomia horizontalis s. longitudinalis* of von Ammon, in which operation a long horizontal cut was made through the entire thickness of the lid, to form a bridge which remained attached only at its temporal and nasal ends. The purpose of limiting the incision to the conjunctiva and tarsus was to conserve the vascular connections of the marginal strip through the orbicular muscle and the integument. The ideal results attained by this method in the restoration of the lid-margin to its normal position and direction, seemed to justify its publication in 1876, after sufficient time had elapsed to test the permanence of the cures. In this year the writer's attention was called to the fact that a similar incision had been proposed about three years before by Burow. A study of the operative surgery of the eyelids, as described by Celsus, Aetius, and Paulus Ægineta, showed beyond reasonable doubt that the incision in question was generally known and practiced during the first six centuries of the Christian era. Celsus describes the incision without giving it a name; the other authors mentioned, writing in Byzantine Greek, describe it under the name *ὑποτομή*, which in the Latin version of Aetius by Cornaro is translated, *subsectio*. The name *subsection* may therefore be properly adopted for this incision. The ancient writers state that it must be made deep, and that it must extend from one end of the lid to the

other. The *subsection* was generally combined with the excision of a crescent-shaped portion of integument from the front of the lid, after which the dermal wound was closed with sutures; hence the name *ἀναρραφή*, or sewing upward, although Celsus states explicitly that the tarsal incision may suffice without excising any skin. Burow's brief description of his procedure is almost a paraphrase of the description of the ancient authors, to whom, however, he does not refer. The writer's contribution to the subject consists in the insistance on the inutility, or worse, of the excision of any but a very narrow strip of skin; in the contention that such strip, if excised, should be taken very near to the margin of the lid, close to the row of eyelashes; in a particular manner of inserting the sutures; and in the employment of contractile collodion, painted along the cutaneous surface of the lid parallel to and near the lid-margin, as a substitute in many cases for the excision of even a very narrow strip of integument.

This operation, which gives admirable results when performed on the upper eyelid, has been almost always disappointing when tried upon the lower lid. The modifications devised by Dr. Ewing, particularly as shown in the simplified operation now described by him, make it possible to secure as perfect results in atrophic entropium of the lower lid as have been attained hitherto in operating on the upper lid.

A CASE OF PAPILLOMATOUS EPITHELIOMA OF THE SCLERO-CORNEAL JUNCTION.

By CHARLES J. KIPP, M.D.,

NEWARK, N. J.

MICROSCOPICAL EXAMINATION

By ADOLF ALT, M.D.

(Illustrated.)

TH. B., fifty-seven years of age, otherwise in good health, was first seen by me on April 29, 1902. He came to me on account of a new growth on the outside of his right eye. I found that the eye was free from injection and that its movements were unimpaired in all directions. At the sclero-corneal junction, on nasal side, was seen a yellowish-white

flat tumor, nearly circular in form, about 15 mm. in diameter, and about 5 mm. in height. The growth was firmly adherent to both cornea and sclera. It covered nearly one-half of the cornea. Its surface was uneven, and looked in fact like a wart with a very broad base. The cornea was apparently normal where it was not covered by the new growth. The pupil of the eye was slightly irregular, which was due to some stretched posterior synechiæ. It was active to light and of about the same size as that of the other eye. The iris was normal; the anterior chamber of normal dimensions. The fundus oculi was normal; S $^5/_{18}$. Fig. 1.

Very little could be learned of the patient's history; he had always been in good health and was now. His attention

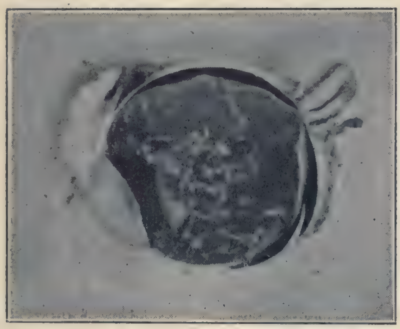

FIG. 1.

had been called to the growth on his eye about six months before he consulted me. Since then it had gradually grown to its present dimensions, and of late the eye had pained him more or less all the time. I advised enucleation, and this was done on May 17. The wound healed without much reaction, and he was discharged from the hospital about eight days later. After that I saw the man about once a week for the next three weeks. During this time he was in good health, but complained of a constant pain back of the right orbit, for which I could find no cause. There was nothing indicative of a recurrence of the disease about the orbit. About a month after the removal of the eye he had a violent fit, which his physician said resembled an epileptic seizure. The convulsion involved all parts of the body. Soon after

this convulsion he became violently insane; he tried to commit suicide and set fire to his house. He was taken to an insane asylum, where he was very violent, but had no return of the convulsion. He contracted dysentery in the latter part of August, and died on September 4, 1902. No autopsy was made.

I am indebted to his family physician, Dr. W. M. Brien, for the history of the case subsequent to the attack of convulsion.

COMMENT.

The apparently intimate connection between the neoplasm and the cornea and the sclerotic, the presence of posterior synchiæ which made me think that the iris and the ciliary body were becoming involved, and the rapid growth of the tumor seemed to me to call for an enucleation of the globe rather than extirpation of the new growth. Moreover, the well-known fact that growths of this nature almost always recur even after thorough removal and cauterization of the base, and the expressed desire of the patient to be relieved as quickly as possible of the pain, were strong arguments against an attempt to extirpate the tumor, a proceeding which, as the anatomical examination shows, would at least have been justifiable.

MICROSCOPICAL EXAMINATION

By ADOLF ALT, M D.

Dr. Kipp kindly gave me about one-half of the eye and tumor for examination. Its macroscopical appearance, showing numerous folds and indentations, at once struck me as that of an epithelial tumor, although the arrangement was not exactly as we see it usually in cases of epithelioma pure and simple. Fig. 2.

On section the tumor was found to consist of numerous papillæ consisting of a small amount of connective tissue in which in every instance one or two blood vessels are enclosed. Every such papilla is covered by an immense mantle of epithelial cells. The cells lying close upon the connective tissue papilla are cylindrical and stand in a regular row of several layers. Farther outward the cells are more flattened and evidently undergoing a regressive metamorphosis from pressure,

as they take up the stains but poorly; the outermost layers are perfectly flat and horny. Where the horny layers of the papillæ are pressed firmly against each other, large and smaller pearl nodules are quite frequent. From the primary papillæ some secondary and tertiary ones are branching out.

On closer examination it is seen that the connective tissue papillæ take their origin from a small amount of conjunctival tissue which underlies the whole tumor close up to its apex upon and near the center of the cornea. This seems to prove

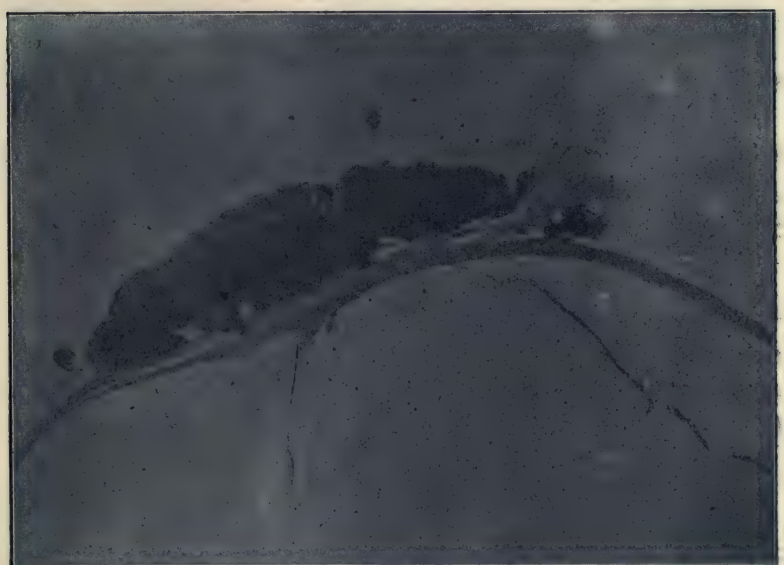

FIG. 2.

that the tumor started from the conjunctiva and gradually grew over the cornea. Fig. 3 and 4.

At its corneal apex the epithelium of the last papilla passes over into a normal corneal epithelium.

The underlying conjunctival tissue shows a small amount of round cell infiltration, very much less though than is usual in cases of epithelioma. Nowhere can I find the beginning, even, of an arrosion of the scleral or corneal tissue and a tendency of the growth to invade these tissues. From this it seems apparent that the growth was not one of very marked malignancy—at least up to the time of the enucleation.

FIG. 3.

The other tissues of the eyeball, as far as included in my part of the eye, show nothing abnormal, except some senile atrophic changes.

When considering the histological character of this tumor we find two distinct points of interest. First, an undoubted

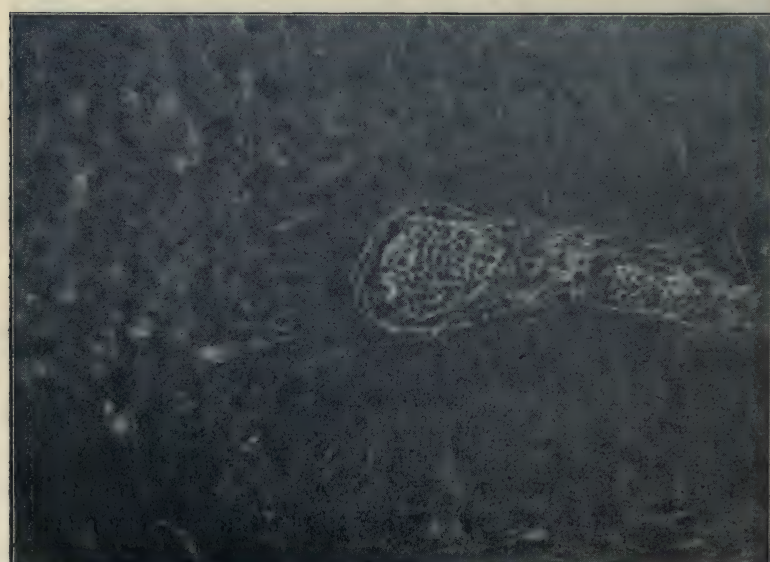

FIG. 4.

new formation of vascular papillæ, springing from the conjunctiva; second, an enormous amount of epithelial tissue covering these papillæ. It seems, therefore, that the growth was at first, perhaps, a simple papilloma, that, however, later on it assumed an epitheliomatous character which at the time of the enucleation had not as yet proven itself to be of the usual malignancy. It is evident from the loose connecnection between the growth and the underlying sclera and cornea (a small amount of conjunctiva severing it throughout from these membranes) that it might still have been removed with preservation of the eyeball.

Such papillomatous epitheliomata on the eyeball have been seen and described a number of times. Several authors (Gayet, Lagrange, Ayres and Demicheri) have described papillomata of the cornea even. In these latter cases there always remains a just doubt as to their real origin. It seems, to say the least, very hard to prove that such a growth has not taken its origin from the conjunctiva, although at the time of removal it seems to concern the cornea only.

I am still of the opinion that the corneal tissue proper never is the origin of such tumors.

A CASE OF CHRONIC ULCER OF THE CORNEA.*

By DAVID McKEOWN, M.A., M.D., M.Ch.,

Honorary Surgeon, Manchester Eye and Ear Hospital.

THE case is interesting from its duration. Its history extends over twenty-three months (sixteen of them within my knowledge), and cicatrization is not yet complete; from the extent of the ulcerated area—the entire surface of the cornea; from the marked difference in depth attained in different regions; from the progress of the ulceration, which in some parts may be said to have been regional; and from the degree of transparency which the cornea now presents. As such cases are somewhat rare, I thought a short statement of the facts and an inspection of the eye would not be unacceptable to you; at the same time I was not unmindful of the probable result of my addressing you—the bringing to light of some of the treasures of the rich experience of the mem-

*British Medical Journal.

bers of this Section. I may add that the few minutes at my disposal do not permit me to discuss the various questions which the case suggests.

The patient is a lady over 60, who came to me in March, 1901, with an affection of the right eye. She stated that she had had a severe attack of influenza in the previous June—that is, about nine months previously; that in August the eye trouble began without apparent cause; that there had been redness, intolerance of light, pain described as neuralgic, and a considerable amount of constitutional disturbance; that the eye had watered, but that there had never been any matter. There was a peripheral deep ulcer of the cornea on the inner side, about a line in breadth, and about one-fifth of the circumference of the cornea in length; it extended to the periphery of the cornea, and was situated about equally in the upper and lower quadrants.

The opinion I formed was that the ulcer was probably due to a lesion of the fifth nerve, the result of the attack of influenza. A statement volunteered some months afterwards by the patient gave some support to this view; it was to the effect that she had got considerably thinner, that her clothes had all to be tightened—an indication that the general nutrition had become impaired. The treatment prescribed (and continued until the present time) was (*a*) local bandage, unlimited hot bathing, antiseptic and stimulating lotions and ointments (chinosol, iodoform—which had to be discontinued—oil of cade, boracic acid); and (*b*) constitutional—aiming at improvement of the general health by attention to food, by general hygienic measures, and by drugs (iron, quinine, strychnine, and phosphorus).

Freedom from pain, and an improvement in general health, were soon reported, but some weeks elapsed before it was certain that the ulcer was healing; the reparative process, however, continued steadily although very slowly, and the eye showed no signs of further involvement until about July. At this time the upper part of the cornea (about one-fourth of the circumference) began to lose its normal appearance, becoming cloudy and vascular; the pathological process progressed so slowly that for weeks it was doubtful whether or not it would be arrested, but ultimately epithelial desquama-

tion took place over the whole area involved, and this aws followed by a large and comparatively deep ulcer. This new ulcerated surface also extended to the periphery of the cornea, but varied in width, ranging from about a line to a line and a half. It is not to be regarded as a simple extension—a gradual encroachment—of the first ulcer, but as arising from some cause or causes acting upon the whole area at one and the same time; the changes at a given moment did not appear to be more marked at the part nearest to the original ulcer than at a point a couple of lines distant.

During the earlier stage of the changes just referred to the reparative process continued in the original ulcer, but during the later stages ulceration once more set in, this time in the direction of the centre of the cornea. I have hitherto mentioned only the inner and upper parts of the cornea, and now have to speak of the lower and outer parts. These also became affected during the time of the involvement of the upper part, but the ulceration here was comparatively superficial, and extended gradually inwards from the periphery, the margin being traceable in the form of a thin somewhat sinuous grey line. At first the appearances were not marked, and therefore were more likely to escape observation, so that I limit myself to saying that the impression left on my mind was not that the ulceration gradually crept from the original ulcer, but that it involved at one and the same time a length of the periphery. The outer portion of the cornea was the last attacked. I had on several occasions considered the advisability of using the cautery, but not understanding in what way any destructive agency or interference could act benecially I refrained.

Other measures, however, having failed, the cautery was employed as a last resort, but apparently without advantage. In November the greater part of the surface of the cornea had been attacked; only an islet in the centre, with an extension outwards, had escaped. At my request the patient, who had declined previous suggestions to that effect, consented to have further advice, and I then had the satisfaction of a consultation with Dr. Little, who also saw the patient a second time in April last. At the latter date the whole surface of the cornea had become involved, and had been so for

about nine weeks. A week ago cicatrization was all but complete; only a small area in the temporal region remained unhealed.

There is some exudation in the pupillary area with posterior synechiæ which may render an iridectomy desirable. Atropine cannot be employed, and the patient will not consent to operation unless it become imperative. With such a history what should be the present condition of the cornea as regards transparency? There are no dense opacities, no great vascularity; and, indeed, it would seem that the impairment of transparency will not be very marked. Moreover, the cornea gives no sign that it has suffered much more severely as to depth in the inner and upper regions than in the lower and outer.

How is this condition of transparency to be accounted for? What has been the influence of the slow rate of repair, and of the topical applications, especially chinosol? I think this case should not be classed as a "rodent ulcer." In a prolonged and disheartening case like the present the surgeon may have two tasks—to treat the disease and to manage the patient; and the latter may be the more difficult and, indeed, at times the more important, as a refractory patient may bring about failure where the treatment should ensure success. It would he impossible to find a patient more desirable in respect to management, indeed her business since she came under my care has been looking after her eye, and the satisfactory condition of the cornea is largely due to her unremitting perseverance.

NOTES ON FORTY CASES OF EXTRACTION OF THE LENS IN CASES OF HIGH MYOPIA.*

By ADOLPH BRONNER, M.D.,

Senior Surgeon to the Bradford and Ear Hospital; Laryngologist to the Bradford Royal Infirmary.

THE question of the removal of the lens in cases of a high myopia has been so frequently and thoroughly discussed during the last few years that I feel quite reluctant to bring it before you again to-day. For some reason or other, however, the operation is not performed so frequently in this country as on the Continent, possibly because cases of high myopia are less common, and also because there is among the public a more or less justifiable aversion to any operative interference.

There is still a great difference of opinion as to the nature of the cases on which we should operate, and on the results of such operations. Most surgeons, I think, agree that we should not remove the lens in cases under —16 D. But there are numerous exceptions to this rule. For instance, those cases in which the use of correcting glasses causes severe pain, or only affords a moderate amount of vision, or when the nature of the patient's occupation or his personal vanity exclude the use of glasses; and, lastly, in the case of children, where the myopia is hereditary and progressive. In most of such cases I only operate on one eye. I have removed the lens in four cases of —9 and 10 D., in which glasses caused intense pain, and in one case in which a man, a clerk, with —12 D., could not with any correcting glasses see well enough to keep his books. Four outdoor laborers with —9 and —13 D. were enabled to follow their occupation much better after removal of the lens. One man with progressive myopia of —12, who was employed at a foundry, was unable accurately to strike the hammer when wearing glasses; after operation he could see much better. Five ladies with —9 and —12 D. refused to wear glasses, and were much more comfortable after extraction of one lens. In three cases of progressive myopia I removed the lenses when the myopia had reached —12 D. There was no further increase of the myopia.

*British Medical Journal.

Should we operate when one eye is practically emmetropic and the other very myopic? Certainly, because experience has proved over and over again that the myopia in these cases is generally progressive and is attended with much asthenopia. I have operated on three such cases. In two the myopia, which had been progressive, became stationary, and in the third it did not increase very much. Should we remove both lenses in ordinary cases of high myopia?

In children I prefer to remove both, and in adults only one, and to wait a year or two before touching the other eye. Of course if there should be the slightest signs of diplopia or strabismus, or increase of the myopia or asthenopia, the second eye should be operated on at once.

The advantages of the operation are so very obvious, and have been discussed so frequently, that I will not dwell upon them. I am sure that there are a very large number of cases of high myopia, especially outdoor laborers, who, although they can see fairly well with correcting glasses, would see much better, and be much more comfortable and better able to follow their employment, if one or both lenses were removed.

There can be no doubt that the operation is attended with a certain amount of risk, although some authors calmly state that this is not the case.

Septic infection certainly should not occur often, but numerous cases have been recorded. I have not had a single case of sepsis in any of my cataract operations during the last eight years, and these number many hundreds. It is most difficult to prove if the extraction of the lens predisposes to detachment of the retina or not. Pflüger has only seen one case of detachment after 140 operations for high myopia, and these patients have been under observation for at least four years. Whereas Mooren states that in 5,631 cases of high myopia, with central choroidal changes, which were not operated on, the retina ultimately became detached in 1,286 cases, or nearly 23 per cent. Out of my 40 cases detachment occurred in two, both children under 16, and six and fourteen months after the operation.

Then there is the danger of glaucoma. This may occur not only after discission of the lens, but also (and these are

the dangerous cases) after linear extraction and discission of the capsule. I have observed it in no fewer than four cases which occurred two or three weeks after the final operation. It is, therefore, of the greatest importance that all cases, especially of adults, should be carefully watched for at least six weeks. In three of these cases iridectomy removed all the symptoms, and in one there was slight permanent cupping, and the vision was only $^6/_{24}$, with contracted field. Similar cases have not been frequently recorded, and I should be glad to hear from the members present if they are of common occurrence.

In two of my cases, both after discission of the capsule and some weeks after the removal of the lens, thick floating opacities appeared in the vitreous, and the vision was permanently damaged. I do not believe that this was due to infection at the time of operation. Both were pale, unhealthy looking girls, and one of them certainly syphilitic.

The distant vision after removal of the lens is, in my experience, very rarely quite as good as one would expect; $^6/_6$ is very unusual, and $^6/_9$ not very common. The near vision, however, is better in most cases.

Some surgeons refuse to operate when there are any central choroidal changes. In 12 of my cases there were well-marked changes, but in no case did these increase, or could I find any fresh retinal or choroidal hæmorrhages after the operation. The vision also improved in a most unexpected manner. In six of these 12 cases the vision was $^6/_{36}$, or less before the operation with correcting glasses, whereas it improved to $^6/_{18}$, and in one case to $^6/_9$, after removal of the lens.

I have only careful records of the fields of vision of eight of my cases, and in six of these there was, after six or eight months, a distinct increase of the temporal half of the field, especially for colors.

As regards the methods of operation, I think most surgeons perform discission of the lens and remove as much of the lens matter as possible at the same time. In some cases a second linear extraction became necessary, but the danger of glaucoma and cyclitis is certainly much less than if we only do discission, and then extract in a few days. We should

be careful not to damage the posterior lens capsule, and to avoid even the slightest loss of vitreous. After the age of 38 or 40 we should perform the ordinary operation for extraction of senile cataract with iridectomy. We know that in cases of high myopia the nucleus of the lens is not so dense as in ordinary eyes.

Mr. Devereux Marshall thought that considerable risk was incurred if a myopic eye were operated upon with an emmetropic one on the other side. Sympathetic inflammation, though rare, might come on, and he could not see what benefit it would be to have the lens removed, for the two eyes would never work together, and he considered the risk involved was altogether out of proportion to the gain that could be expected.

Dr. Hill Griffith had a very alarming case of acute glaucoma supervene some time after a straightforward and successful evacuation of broken-up lens substance. After iridectomy a perfect recovery with good vision took place. His experience, though not large, was good, and he should probably be inclined to do the operation more frequently.

Mr. Holmes Spicer said he had had gratifying results, but the patients were always more pleased and got greater help out of the first eye than when the second was done. They appeared to be able to read better with only one eye than when the two were operated upon.

Mr. Charles Wray said he had been discouraged in the operation on account of the adverse expression of opinion which had been obtained when he read a paper on the subject some years ago before the Ophthalmological Society. He described a case of posterior lenticonus in which the lens subsequently became opaque, and after removal of the cataract the vision became quite good. In another case the eye supurated. He had seen the tension of these eyes improve after the operation.

CORRESPONDENCE.

WESTERN OPHTHALMOLOGIC AND OTO-LARYNGOLOGIC ASSOCIATION.

CINCINNATI, January 17, 1903.

Editor AMERICAN JOURNAL OF OPHTHALMOLOGY:

Dear Doctor:—The enclosed is a list of the names of those members of the Western Ophthalmologic and Oto-Laryngologic Association who will participate in the program at the next regular meeting, to be held at Indianapolis, Ind., April 9, 10, 11, 1903. The subject selected by each will be found accompanying his name.

The exact order of papers will be arranged later on by the program committee, but most likely the morning session of the first day of the meeting and the afternoon session of the last day will each be a joint session, when a full attendance is requested and expected. The official and final program will appear shortly before the date of the opening session.

The Ophthalmic papers, covering as they do a wide range of topics of vital interest and importance to the every-day ophthalmic surgeon, will be of rare interest and full of profit, while the papers presented to the Oto-Laryngologic Section will be *exceptionally good.*

The committee will so arrange the program that there will be ample time for full discussions. All may anticipate the most interesting and profitable meeting in the history of our Association.

Lively interest is being manifested in our rapidly growing organization, and to all who are eligible for membership we extend an open-handed and cordial invitation to join our ranks.

Applications for membership should be made to the Secretary,

DR. DERRICK T. VAIL,
22 W. Seventh Street, Cincinnati, O.

PRELIMINARY PROGRAM.

Ophthalmologic.

1. Episcleritis. Dr. Adolf Alt, St. Louis, Mo.

2. Keratoconus: Etiology, Early Diagnosis and Treatment. Dr. J. A. L. Bradfield, LaCrosse, Wis.

3. Some Experiences in the Operation for Complicated Cataract. Dr. J. E. Brown, Columbus, O.

4. Hysterical Amblyopia, with Report of Cases. Dr. A. E. Bulson, Jr., Ft. Wayne, Ind.

5. Clinical Experiences in the Management of Phoria Patients: Failures and Successes. Dr. J. Elliot Colburn, Chicago, Ill.

6. Degenerate Ocular Changes Resulting from Consanguinity of Parents. Dr. Lee Wallace Dean, Iowa City, Ia.

7. Electro-Cautery Treatment of Wounds and Ulcers. Dr. Jno. A. Donovan, Butte, Mont.

8. Series of Glaucoma Cases. Dr. Geo. F. Fiske, Chicago, Ill.

9. On Some Points in the Operation for Cicatricial Ectropium. Dr. Ferd. C. Hotz, Chicago, Ill.

10. Blepharitis Marginalis. Dr. Dudley S. Reynolds, Louisville, Ky.

11. Sarcoma of the Choroid. Dr. W. S. Samson, Lancaster, O.

12. Rare Ocular Lesions in Scarlatina. Dr. E. O. Sisson, Keokuk, Ia.

13. The Influence of Environment on the Eye. Dr. Hamilton Stillson, Seattle, Wash.

14. Paresis and Paralysis of the Muscle of Accommodation. Dr. Geo. F. Suker, Chicago, Ill.

15. Monocular Triplopia. Dr. Cassius D. Wescott, Chicago, Ill.

16. Retrobulbar Optic Neuritis. Dr. W. H. Wilder, Chicago, Ill.

17. Exsection of the Tarsus in Certain Forms of Chronic Trachoma. Dr. Casey A. Wood, Chicago, Ill.

Oto-Laryngologic.

1. President's Address. Dr. Wm. L. Ballenger, Chicago, Ill.

2. Superheated Medicated Air in Diseases of the Nose and Ear. Dr. J. C. Beck, Chicago, Ill.

3. Progress in Otology in Fifty Years Past. Dr. Fayette C. Ewing, St. Louis, Mo.

4. Report of Cases of Laryngeal Paralysis Due to Aortic Aneurism. Dr. Hal. Foster, Kansas City, Mo.

5. An Unusual Case of Spontaneous Bilateral Hæmorrhage from the Ear. Dr. M. A. Goldstein, St. Louis, Mo.

6. Present Status of the Treatment of Mastoiditis. Dr. Geo. F. Keiper, LaFayette, Ind.

7. Middle Ear Affections in Tuberculosis. Dr. Robt. Levy, Denver, Col.

8. Pseudo-Torticolis, with Abnormal Associated Movements of the Head and Eyes. Dr. Eugene R. Lewis, Dubuque, Ia.

9. Tinnitus Aurium. Dr. Chas. S. Means, Columbus, O.

10. Some Cases of Asthma Treated by Removal of the Middle Turbinate. Dr. T. W. Moore, Huntington, W. Va.

11. The Principles of Rhinologic Practice. Dr. Edwin Pynchon, Chicago, Ill.

12. Inflammatory Conditions of the Upper Air Tract as they Occur in the Northwest. (By invitation.) Dr. Jac. E. Schadle, St. Paul, Minn.

13. Remarks on Etiology of Hypertrophic Rhinitis. (By invitation.) Dr. E. L. Shurley, Detroit, Mich.

14. A Discussion on the Differential Diagnosis and the Treatment of Osteo-Sclerosis of the Mastoid Process. Dr. O. J. Stein, Chicago, Ill.

15. Naso-Pharyngeal Fibroma — Exhibition of Photographs and Specimens. Dr. J. A. Stucky, Lexington, Ky.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

TEN INSTRUCTIVE CASES FOR THE GENERAL PRACTITIONER OF MEDICINE, WITH REMARKS UPON THE DETECTION AND RELIEF OF EYE STRAIN.

Ambrose L. Ranny (*New York Medical Journal*, Nov. 22, 1902) selected these ten cases to prove that a thorough examination and correction of all eye strain can cure, in some instances, cases that cannot be relieved by medication, and are apparently hopeless.

In Case 1 perfect recovery followed the relief of eye strain, after a diagnosis of cerebral softening had been made, and complete mental failure existed.

Case 2 shows that chronic diabetes may be caused by eye strain, and that relieving the eye strain may cause a disappearance of sugar in the urine.

Case 3 was one of severe periodical attacks of laryngeal spasm which at times seemed to imperil life.

Two cases illustrate the relationship between eye strain and neuralgia. One was orbital and the other was neuralgia of the stomach.

Eye strain as a cause of persistent reflex spasm of a group of muscles is illustrated.

Three cases of epilepsy are reported as cured by the relief of eye strain.

One case was emmetropic, the muscles being at fault. Another was relieved from convulsions for years by the wearing of glasses. The third case was one in which convulsions had persisted for twenty-four years. Proper treatment arrested the seizures, and the patient has remained well for over sixteen years.

AN OPERATION FOR PTERYGIUM.

McReynold's (*Jour. Amer. Med. Assn.*, Aug. 9, 1902) recommends the following modification of Desmarre's operation:

1. Grasp completely the neck of the pterygium with strong but narrow fixation forceps.

2. Pass a Graefe knife through the constriction and as

close to the globe as possible, and then with the cutting edge turned toward the cornea shave off every particle of the growth smoothly from the cornea.

3. With the fixation forceps still hold the pterygium, and with slender, straight scissors divide the conjunctiva and subconjunctival tissue along the *lower* margin of the pterygium, commencing at its neck and extending toward the canthus, a distance of one-fourth to one-half of an inch.

4. Still hold the pterygium with the forceps and separate the body of the growth from the sclera with any small, noncutting instrument.

5. Now separate well from the sclera the conjunctiva lying below the oblique incision made with the scissors.

6. Take black silk thread armed at each end with small curved needles and carry both of these needles through the apex of the pterygium from without inward and separated from each other by a sufficient amount of the growth to secure a firm hold.

7. Then carry these needles downward beneath the loosened conjunctiva lying below the oblique incision made by the scissors. The needles, after passing in parallel directions beneath the loosened lower segment of the conjunctiva until they reach the region of the lower fornix, should then emerge from beneath the conjunctiva at a distance of about one-eighth to one-fourth of an inch from each other.

8. Now, with the forceps lift up the loosened lower segment of conjunctiva and gently exert traction upon the free ends of the threads, which have emerged from below, and the pterygium will glide beneath the loosened lower segment of the conjunctiva, and the threads may then be tightened and tied and the surplus portions of thread cut off, leaving enough to facilitate the removal of the threads after proper union has occurred.

It is very important that no incision should be made along the upper border of the pterygium, because it would gap and leave a denuded space when downward traction is made upon the pterygium.

THE LOCAL USE OF IODINE IN CORNEAL ULCERS.

J. Lawton Hiers (*Phila. Med. Jour.*, Nov. 29, 1902) claims priority for the use of iodine in the treatment of ul-

cers of the cornea. Since he began this plan of treatment, in 1895, he has treated over two hundred cases with good results. The author thinks it lessens rather than increases scar tissue.

PRIMARY SARCOMA OF THE IRIS.

Casey A. Wood and Brown Pusey (*Archives of Ophthalmology*, July, 1902) in the histologic examination of forty-one cases found that the enucleated globe showed that the iris was not the only tissue involved. In following up cases that had been treated by iridectomy, evidences of the continued growth of the tumor were found in many patients.

As the result of their investigations, they do not agree with Fuchs who thinks that in certain cases iridectomy is all that is necessary, but advise an enucleation in every case in which a positive diagnosis of sarcoma of the iris has been made.

THE SYSTEMIC OR CONSTITUTIONAL CHARACTER OF GONORRHŒA, ILLUSTRATED BY FIVE CASES OF IRIDO-CHOROIDITIS.

Chas. Stedman Bull (*N. Y. Medical Record*, Dec. 20, 1902) refers to the gradually accumulating evidence of the constitutional character of the gonorrhœal infection, and finds that irido-choroiditis is not an uncommon complication, and must be regarded as directly connected with the urethritis.

"The iritis or choroiditis is very distinct from the usual type of rheumatic inflammation. It is very sudden in its onset, very rapid in its development, the pain is exceedingly severe, and the loss of vision is very rapid and complete. But the inflammatory process, though obstinate and subject to frequent relapses, eventually rapidly subsides, and usually leaves little or no trace behind it. There is almost never any gelatinous or fibrinous exudation in the anterior chamber, and the main cause of the rapid and marked deterioration of vision seems to be due to a general serous infiltration of the iris and choroid, and a diffuse serous exudation into the aqueous and vitreous humors, more marked in the latter. Posterior synechiæ do form, but they are readily broken, and as a rule, leave no trace behind on the anterior capsule of the lens. Such an iritis, or irido-choroiditis, is liable to relapse, even when no adhesions are present, whenever the patient

contracts another case of gonorrhœa. A neglected gonorrhœal iritis, in which multiple adhesions have been formed, may of course readily relapse, and in consequence of these relapses the symptoms of the disease gradually lose their peculiar character. The disappearance of the iritis under appropriate treatment, without leaving posterior synechiæ, proves the absence of the plastic character. Its prompt disappearance distinguishes it also from the usual form of serous iritis."

In the reported cases salicylate of soda in full doses was given. When it produced gastric disturbance salicylate of cinchonidia or iodide of potassium with quinine were substituted. Local treatment consisted of leeches to the temple, hot fomentations, and frequent instillations of a one per cent. solution of atropine and a two per cent. solution of cocaine.

THE ROLE OF THE TOXINS IN INFLAMMATION OF THE EYE.

Robert L. Randolph (*The American Journal of the Medical Sciences*, November, 1902) draws the following conclusions:

1. Bacterial toxins, so far as tested, when instilled even for many hours into the healthy conjunctival sac were found incapable of producing inflammation or causing other injury.

2. The same toxins when injected into the tissue of the conjunctiva or into the anterior chamber invariably set up local inflammation, the extent and intensity of the inflammation varying to some degree, according to the species of bacterium yielding the toxin.

3. Bacteria which had not previously been proven to produce soluble toxins were found to produce them even in young cultures, and it is suggested that injections of bacterial filtrates into the eye, particularly into the conjunctival tissue, constitute a more delicate biological test for the detection of certain toxins than the tests usually employed for this purpose.

4. The experiments recorded in this paper furnish additional examples, in a comparatively new field, of the importance of toxins in explaining the pathogenic action of bacteria, and likewise emphasize the etiological significance of injuries of the covering membrane of the eye in favoring the action of toxins and of bacteria.

JUVENILE CATARACT, WITH ESPECIAL REFERENCE TO THE LAMELLAR FORMS, WITH REPORT OF CASES.

Francis Alter (in a paper read before the Toledo Medical Association, Jan. 24, 1902) draws the following conclusions:

1. That rhachitis and congenital lues, to which may be added convulsions, play important roles in the production of this form of cataract.

2. That heredity, influenced by scrofula, congenital lues and rachitis, plays a most important part in the formation of this variety of cataract. That it seems to impart a dyscrasia distinctly meso-epiblastic in character, as is evidenced by a more or less simultaneous degeneration of the crystalline lenses, the teeth and the bones, the latter usually taking the form of craniotabetic malformation or degeneration.

3. That the theory of the production of this form of cataract by a sort of massage of the soft, newly formed lens fibres against the comparatively hard nucleus, this process being superinduced by convulsions (violent spasm of the ciliary muscles), is untenable and not worthy of serious scientific consideration.

4. That an early operation offers the best results. It forestalls the development of an amblyopia exanopsia, and effectually blocks the development of a myopia, with its possible baneful accompaniments.

5. That discission should be the operation of choice, preferably a crucial incision with some lenticular implantation of the knife; the instrument of greatest value being the smallest size knife needle of Knapp's.

6. Complications should be promptly met. First by paracentesis, or, if necessary, by simple linear extraction or exceptionally, by the removal of the lens in toto either by the simple or the combined method.

7. The possibility of this form of cataract becoming total, coupled with the probability of its being made the subject of a cholesterin or calcareous deposit, thereby adding an additional menace to the eye, greatly complicating a future discission or extraction, if needed, places iridectomy in these cases in the realm of doubtful surgery.

8. That full dilatation of pupils with atropine must be secured and maintained, and that atropine, coupled with the

more or less continuous use of iced cloths, are the two medical essentials in the after treatment of these cases.

9. That the use of refrigeration is a most potent weapon in combating the too violent operative reaction. Its use very effectually limits the too violent swelling and the subsequent too abundant extrusion of lens fibres, thereby helping very materially in annulling the possibility of occurrence of two of the most important complications—glaucoma and irido-cyclitis.

HOT AND COLD WATER IN EYE DISEASES.

W. O. Nance (*Medical Standard*) discusses the employment of hydro-therapeutic measures in the treatment of diseases of the eye, and makes the following observations:

1. Heat and cold are best applied to the eyes by means of moist pads. They are more efficacious when employed in this manner than by means of the coil or bladder, in that their action is more penetrating, and their effect is more germicidal.

2. The application of heat is indicated in degenerative corneal process—interstitial and phlyctenular keratitis, corneal ulcers, pannus, infected corneal wounds, suppurative panophthalmitis, in iritis and cyclitis, in muscular spasm, and in contusion and ecchymosis of the lids (black eye) to hasten the absorption of extravasated blood.

3. The application should be of the highest temperature the patient can endure (110 to 135) for a period of fifteen minutes, and repeated at intervals of two or three hours for several hours.

4. Cold is indicated in hyperemia and inflammations of the conjunctiva. In purulent conjunctivitis it is the remedy par excellence. In traumatisms, especially those of the iris and lens and in the early treatment of contusions of the lids its employment is of value.

5. In purulent conjunctivitis iced applications may be continuously used for many hours so long as the cornea remains unimpaired, in which instance they are positively contraindicated.

6. Hot applications greatly assist the rapid absorption of various medicaments employed in ophthalmic practice, and when used for this purpose should immediately precede the instillations of such solutions.

OBITUARY.

PHOTINOS PANAS.

Dr. Photinos Panas, member of the Academy of Medicine, honorary professor in the Faculty of Medicine, officer of the Legion of Honor, honorary surgeon to the hospitals, died on the 6th of January at his home at Roissy (Seine and Marne), at the age of 71 years.

He was borne of Greek parentage at Cephalonia (Ionian Islands) on Jan. 30, 1832. While quite young he came to Paris to study medicine; in 1854 he was made interne of the hospitals of Paris; given the gold medal of the Faculty in 1856; made assistant in 1859 and prosector of anatomy in 1861. He passed a brilliant examination on March 3, 1860, with an inaugural thesis which showed his predilection for the special branch of medicine in which he became a master (anatomy of the nasal cavities and the lacrimal passages).

Being naturalized in France he was made assistant professor in the section of surgery in 1863 with a thesis on "Vicious Cicatrization and the Means of Preventing It," and in the same year surgeon of the central Bureau (1863-64). Dr. Panas was in charge of surgical work in nearly all of the hospitals. Bicêtre (1865); Lourcine (1865 to 1866); Midi (1867); Saint-Antoine (1868); Saint-Louis (1869-72); Lariboisière (1873); Hôtel Dieu (1879-1901).

His work was of the most varied.

In 1859 to 1863 he gave in the École pratique a course on anatomy and operative medicine, and furthermore, public courses on surgical anatomy (1859); on the physiology of the nervous system and the organs of sense (1860); on external pathology (1861); syphilographic clinics at Lourcine (1866); and surgical clinics at Saint Antoine (1868).

As the first in the hospitals of Paris, he performed successfully an ovariotomy in the isolation pavillon of Saint Louis (1870).

In Lariboisière, from 1873 to 1878, he continued to give his clinical lessons on ophthalmology which he had started at

the Bureau central 1869, and at the Saint Louis at the same time while he was in charge of three surgical wards.

At this time he practiced, as one of the first, Lister's method, thanks to which he obtained remarkable results in arthrotomies, congestive abscess, fractures of the radius, strangulated hernia and amputation of the breast.

From 1872 to 1878 he gave a complimentary course in ophthalmology at the Faculty, and when the chair of clinical ophthalmology was created in 1879 he was called to it.

He had only recently retired, in 1901. Dr. Panas was a specialist in diseases of the eye. His great knowledge in this branch and his success made him a well known and highly appreciated physician the world over.

He leaves numerous works. Among them: An edition of Malgaigne's lectures on orthopædics (1862); numerous memoirs on the anatomy, physiology, pathology and operative medicine of the joints in general, and especially of the shoulder-joint and knee-joint; a paper on the so-called rheumatic paralysis of the radial nerve; the article on orthopædics in the dictionary of practical medicine and surgery; a memoir on the paralysis of the cubital nerve due to pressure; some highly praised works, as: Lectures on strabismus (1873); lectures on keratitis (1876); lectures on the affections of the lacrimal apparatus (1877); lectures on retinitis (1878); lectures on the inflammatory diseases of the deep membranes of the eye (1878); pathological anatomy of the eye, with Dr. Reney (1879); complete treatise on the diseases of the eye (two volumes, 1894).

Dr. Panas founded the *Archives d' Ophtalmologie* in 1880. He was elected a member of the Academy of Medicine, in the section of surgical pathology, on December 18, 1877, and was its president in 1899. This excellent professor, made Knight of the Legion of Honor February 22, 1871, was promoted to officership April 19, 1895. He was a member of the surgical society since 1865, and honorary member since 1888, having been its president in 1887.

Although at heart a good Frenchman—he showed it in 1870—Dr. Panas never forgot the country of his birth. Thus, when the last war between Greece and Turkey broke out he immediately organized in Paris an ambulance corps which rendered the greatest services.

Professor Panas takes with him the regrets of all who knew him. He was an amiable scientist and a good man.—*Gazette Médicale de Paris.*

BOOK REVIEWS.

Universal Test Characters, Particularly Applicable as Visual Tests for Children. (With 14 Engraved Plates). By Arthur E. Ewing, M.D. St. Louis: *Nixon-Jones Printing Co.* 1902.

We wish to draw the attention of our readers to these practical, well selected and beautifully executed test figures for the examination of the vision of children and analphabets after the scale of Snellen. Whosoever has had occasion to examine children frequently knows with what difficulties we have to contend in the use of the few test figures thus far published by Snellen and others. Dr. Ewing's figures consist of a cross, horseshoe, square, circle, chair, rocking chair, pitcher, star, heart, mug and teapot, all of them objects easily recognized and named by small children even. It seems the oculists should be very thankful to Dr. Ewing for his painstaking labor in bringing out this aid to our equipment for useful and successful work.

Grundriss der Pathologischen Histologie des Auges. (Text-book on the Pathological Histology of the Eye). By Dr. Sigmund Ginsberg. With 107 Illustrations. Berlin: *S. Karger.* 1903.

Whoever is engaged in or simply interested in the pathological histology of the eye should possess this book, which is decided to fill a gap which its predecessor (the reviewer's own book) has long been unable to fill. To be sure, it is a rather difficult undertaking to write at this stage such a text-book, the more praise that the author has succeeded so well. We should have liked to see a few more references to the work of others, especially to work done in this country. We might also wish that the illustrations were still better than most of them are—but these are minor points. The book is good and highly to be recommended. Alt.

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ORIGINAL ARTICLES.

FATAL HÆMORRHAGE FROM THE CONJUNCTIVA IN THE NEW-BORN, WITH REPORT OF CASE.

BY MEYER WIENER, M.D.,
ST. LOUIS, MO.

SPONTANEOUS fatal hæmorrhage from the conjunctiva, with death due directly to the hæmorrhage itself, is extremely rare; so much so, that in a most careful search through the literature, I have been able to find but two cases besides the one which I report to-night.

One is that reported by Dr. Friederich Mueller, from the clinic of Prof. Gusserow. He calls it "Hæmophilia Congenita" or "Tödtliche Blutung aus den Augenbindehäuten." This case was almost identical with my own.

The other is that reported by Abbé in the *American Journal of Ophthalmology*, January, 1899.

Hansell of Philadelphia reported a case of hæmorrhage in an infant, but this baby died more than a week after the hæmorrhage had been checked.

Jessop reports five cases of severe hæmorrhage—three of which recovered. But all of these cases were due to some anatomical change such as nævus, granulations, etc.

Sharkey reported a fatal hæmorrhage which resulted from scarification of the lids.

Nettleship in his text book mentions a case of hæmorrhage following ophthalmia neoatorum, but does not say that was fatal.

Stoewer reports a case of severe hæmorrhage in a child of six months, where bleeding was constant during the day time, but stopped when the child was asleep. The source was found to be a small sessile growth in the middle of the upper lid of the left eye. When this was removed and curretted, the hæmorrhage ceased, but the child died two days later.

Pomeroy reports a case of well-nigh fatal hæmorrhage from the conjunctiva, which continued for two days and was stopped by a compression bandage.

The hæmorrhage in four of these cases followed the use of nitrate of silver. In none of them, however, was it used as recommended by the best authorities to-day, i. e., the instillation of one drop of a 1 per cent. solution in each eye. Crédé originally advised one drop of a 2 per cent. solution.

Pomeroy's case started about ten hours after the instillation of two drops of a 2 per cent. solution of nitrate of silver, which was neutralized, however, by a salt solution dropped into the conjunctival sac from a spoon.

De Schweinitz's case followed the use of, first, a 2 per cent. and then a 4 per cent. solution of nitrate of silver.

In Abbé's case a 6 per cent. solution was used instead of a 2 per cent.

In Mueller's case one drop of a 1 per cent. solution was instilled and as gonorrhœa was suspected, an additional drop was instilled that same evening.

In my case 2 gtts of a 2 per cent. solution were used.

The history of the case which I have to report is as follows:

The mother, 22 years of age, had a number of chancroids on the labia and near the urethral opening. She had a purulent discharge in which the gonococcus was found. There was no history of hæmophilia on the side of either the mother or father, so far as could be ascertained. Pains commenced on the night of September 8th, 1902, and the child was delivered on September 9th at 4 a. m. Two drops of a 2 per cent. solution of nitrate of silver were instilled into each eye immediately after confinement. On the following morning

the eyelids, face and pillow were covered with blood. The bleeding had first been noticed at about 5 o'clock a. m.

I first saw the case that afternoon at about 2 o'clock. I found the lids and face again covered with blood, as well as the pillow on which the head rested. The face was washed and the fresh clots were removed. The palpebral conjunctiva was covered with a white membrane, which seemed to be a slough of the epithelium and which later disappeared. Several drops of a 1 to 3,000 solution of adrenalin chloride were instilled into each eye with very little if any effect. These drops were ordered continued every three hours and also ice water applications for ten minutes at a time every hour.

Next morning the slow persistent oozing was still present. A 1 to 1000 solution of adrenalin was now used, several drops being instilled at intervals of about two minutes, until 3 or 4 drops had been used in either eye.

The hæmorrhage from the right eye seemed to be about stopped and that from the left nearly so. A tight compression bandage was now applied. The next morning the bandage as well as the pillow on which the child lay was soaked with blood, at about 3 a. m. The blood was of a paler color but still clotted readily. The clots were now well removed from the conjunctival sac and a careful inspection was made. The lids were not swollen neither was the conjunctiva—the latter was slightly red and an oozing was evident, which could not be traced to any particular point but seemed to come from the entire surface. No ulceration or abrasion could be seen. Adrenalin chloride was again used; the lids were everted and rubbed with stick alum, but with no effect. Pure adrenalin powder was now applied but was washed away like dust. A tight compression bandage which was applied, was on the next day again soaked with blood. All previous efforts were again resorted to and in addition the conjunctival sac was washed out with a solution of gelatin. After this, for the first time, the hæmorrhage seemed to be altogether checked. The tight bandage was reapplied. After this I waited for about half an hour and as I could detect no further oozing under the bandage, I left the patient.

At 2 o'clock the next morning the nurse noticed that the bandage was again stained and by noon the bandage, cheeks

and pillow were again soaked. The blood was much paler but still coagulated readily. All this while the child was taking nourishment nicely and had a strong healthy cry. The mother had plenty of milk.

As the child was now extremely anæmic, a normal salt solution was injected into the rectum. All previous efforts at checking the hæmorrhage were renewed, and an attempt was made to pack the conjunctival sac with gauze, but the blood still oozed through it. Digital compression was then made for about an hour with no success as to stopping the flow of blood.

A piece of cork was now fitted over each eye, wrapped carefully, but not thickly with gauze; and, after approximating these and making tight compression over each eye, a tight bandage was applied regardless of any injury it might do to the head.

From the second day of the treatment at the suggestion of Dr. Justin Steer, the baby was getting, internally, 2 gtts of calcium chloride solution (20 grains to 1 ounce) every four hours.

At 9:15 a. m. on September 15th the baby died. A post mortem examination showed the organs to be normal and no internal hæmorrhages. Microscopical examination of a section of the conjunctiva showed nothing abnormal.

The case of Mueller was very similar to this one. Here a 1 per cent. solution of silver nitrate was used at birth, and that same evening as a slight whitish discharge was seen and as gonorrhœa was suspected, a second drop was used. Next day there was a soft clot of blood over the eyelids, which was carefully removed and light-red blood began to ooze slowly from the conjunctival sac, but no swelling or redness of the conjunctiva could be seen. The oozing was general. A tight bandage was applied and the next morning the bandage was soaked. Instillation of chlorine water was now used and the tight bandage reapplied. This bandage, also, soon became soaked and was removed on the third day. Notwithstanding the anæmia the child was still lively and feeding from the breast. On the fourth day the eyes were still bleeding, and in the evening the baby died.

A post-mortem examination showed nothing abnormal.

Mueller questioned whether the nitrate of silver played any part in causing the hæmorrhage. He considered the case as one of hæmophilia, although there was no previous history of such an affection in the family. Abbé, also, doubts whether the silver nitrate caused the hæmorrhage in his case.

To my mind, the silver nitrate was the occasion, but the cause was undoubtedly a predisposition of the child to bleed.

ON THE REMOVAL OF THE EYE-BALL TOGETHER WITH THE TARSI, CONJUNCTIVAL SAC AND LID MARGINS.

By ADOLF ALT, M.D.

AFTER a verbal communication made to the American Ophthalmological Society in 1882, Dr. John Green, in the June, 1884, number of this journal, published an article on "An operation for the removal of the eye-ball, together with the entire conjunctival sac and lid margins," which, as it seems to the writer, has not been appreciated as it should be.

In the modern treatises on the surgery of the eye I can find no reference to it, except in W. Czermak's Eye Operations (Die Augenaerztlichen Operationen), page 419. He says: "In cases in which the wearing of an artificial eye is *a priori* impossible, because the conjunctival sac is, even if partly only, shrunken, it will be best to attempt to obliterate the whole cavity and to obtain a lasting closure of the palpebral fissure. For, nothing looks more disfiguring than a partially open palpebral fissure, with deeply sunken eyelids, showing an empty cavity. Moreover, the patient is continually annoyed by the flow of tears and conjunctival secretion, the normal removal of which is prohibited by the disarrangement of the drainage apparatus." In a foot-note he refers only to Andrew: On the enucleation of the eye-ball with obliteration of the conjunctival sac (*Brit. Med. Journal*, Dec. 19, 1895). Obviously, the author was not acquainted with the earlier communication of Green, who, in June, 1884, referred to three cases operated upon by himself and to one by the writer.

The method employed by both of us was, after the enucleation of the eye-ball to draw forth the tarsal tissue and conjunctiva by means of forceps, to cut it off from the cutaneous and muscular covering and then to cut off the lid margins. Finally the lid margins are well adapted to each other and carefully stitched. The result is a perfect cutaneous wall, covering the orbit with a barely perceptible linear scar where formerly the palpebral fissure opened.

Czermak recommends to first split the lids into their two parts (tarsus and skin), then to dissect out the retrotarsal folds and peripheral parts of the conjunctival sac, then to enucleate and finally to stitch together the free borders of the lids. (He evidently does not cut off the lid margins). He also states that the eye-ball may first be enucleated and the conjunctival sac dissected out afterwards.

This, of course, may be as the operator chooses.

The point I wish to insist upon is, that there are undoubtedly a large number of cases in which this operation is the very best thing that can be done for the patient. This is especially so in cases of malignant tumors affecting the lid margins and eye-ball, chiefly in cases of epithelioma. But after the removal of certain cases of orbital tumors together with the eye-ball which are not so very apt to recur, as, for instance, tumors of the optic nerve, this operation has its place.

Since first I did it in 1882, together with Dr. J. Green, at the St. Louis Hospital, I have had occasion to perform this operation in seven cases. The result has always been most gratifying to the patient and myself and no relapse has occurred in any of my cases, as far as I know. It may serve excellently well, even when an epithelioma of the lids has been allowed to eat very considerably into the surrounding tissue and into the depth.

The worst case of that kind I operated upon a few years ago with the assistance of Dr. McCandless at St. Mary's Infirmary. The patient, a circuit judge, had consulted me five years previously on account of, what he thought, a wart on the right lower lid margin. My diagnosis of epithelioma, with the necessary prognosis, seemed to convince him that it was best to have it removed at once and the day for the oper-

ation was set. However, when he had returned home his courage had disappeared and he did not come back to be operated upon. On the contrary, he tried all sorts of home and quack remedies, until just five years after his first visit he entered my office again with the words: "Doctor, now you can do with me as you please; you can even cut off my head." The epithelioma had now eaten away both the outer and inner canthi and part of the lower lid margin which was fastened to the eye-ball by epitheliomatous tissue. The cornea was on the point of perforating and he suffered agonies. I proposed to him the removal of the eye-ball with the whole conjunctival sac and the stitching together of the lids. He fully consented. The operation consisted of the removal of the epitheliomatous and as yet free parts of the margins of the lids and both canthi together with the eye-ball, and tarsal tissue and entire conjunctival sac in one. I had great difficulty in bringing the lid flaps together, especially on the nasal side, even after adding a small sliding flap from the bridge of the nose. Yet the healing was prompt and uneventful and no relapse occurred. Three years later the patient died from apoplexy, and whenever I saw him in the period of three years he expressed to me his gratitude and great satisfaction with the manner in which he had been operated on.

The freedom from continued secretion and irritation, from the unsightly empty orbital cavity, the fact that by covering the orbit new irritations and, perhaps, with them sources of relapses are definitely excluded, seem to make this mode of operating one which should be more frequently employed than as yet it seems to be. For most working people, it would seem to be much better than the wearing of an artifical eye even after simple enucleation.

ASEPSIS AND PROPHYLAXIS IN OPHTHALMOLOGY.

By PROF. PHOT. PANAS.*

Translated by Adolf Alt.

FOLLOWING the example of the general surgeons ophthalmologists have not been slow in recognizing that a new era was beginning, thanks to the immortal discoveries of Pasteur, concerning microbes and the practical applications which Lister has drawn from them.

If ophthalmologists hesitated at first, it was because the preparations of carbolic acid advised by Lister in the form of a spray, watery solution or as gas, did not suit the irritability of the eye and its adnexa. As soon as other antiseptic agents were substituted for carbolic acid, like 4 per cent. boric acid solution, solutions of mercuric salts, as biniodide of mercury 1:20,000, oxycyanide of mercury 1:1500, bichloride of mercury, 1:5000, or 2000 at most, or better still, distilled water sterilized by heat with an addition of a small quantity of chloride of sodium 5:1000, antisepsis found a definite place in operative ophthalmology.

We may state that since the Graeco-Roman epoch it has been known from clinical observation that it was necessary to precede operations concerning the conjunctiva and the lids by the washing of the eye and its adnexa. The fluids used were ocean salt water, ordinary salt water, rose water, decoction of grecian hay (*fenugrec*) with honey and hot honey water.

The Arabs, and especially Albucasis, recommended in the treatment of hypopyon, after the evacuation of the pus had been obtained through a large opening in the lower part of the cornea, an injection of warm honey water into the anterior chamber, or the decoction of grecian hay, just mentioned.

The use of warm water has been continued since, as may be seen by the fact that Saint-Yves recommended injections of warm water into the anterior chamber when the hypopyon or pus on account of its consistency does not flow out at the same time with the aqueous humor.

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*At the same time with the notice of Prof. Panas' death the *Archives d'Ophtalmologie* (January, 1903), published this his last work on a subject to which he had given his especial attention. In the hopes of pleasing our readers it is translated in full.

In order to explain grave accidents and death supervening an operation, in the country as well as in the cities, in consequence of erysipelas and intercurrent pyaemia, it was necessary, before Pasteur, to introduce hypothetically some miasma, which might exist in the air, more particularly so at one time than at another, and the lack of sunlight, as is the case in large cities.

Since then the true cause, which is contagion, or in other words, the direct entry of pathogenic microbes, having been recognized and demonstrated, war against it has been made possible and fruitful.

That is what Lister has done as the first, by using chemical germicides, among which he preferred carbolic acid in solution or as gas, and adding to this, after the example of Chassaignac, the drainage of the wounds by means of perforated rubber tubes in order to obviate the accumulation of organic fluids which might disintegrate and might retard the healing by first intention. He also used other germicides, as boric acid and chloride of zinc, as he had found a good effect of these remedies in cases of ulcers and suppurating wounds.

Since then it has been found that dry heat as well as moist heat, as they can be obtained by boiling and steam, constitute potent means of defense, which, moreover, are not toxic and are well borne, as they do not irritate delicate tissues, like those of the eye and its adnexa. Only, it was wrong to look upon this as a method of defense, called *asepsis*, in opposition to that of Lister, called *antisepsis*. For it is well to remember that by either method we succeed less in killing the microbes than in rendering them inoffensive to the living tissues, which agrees with what has been found experimentally in the test-tube concerning all known antiseptics. We do not only find microbes in great numbers in phenic acid solutions, or mercuric solutions and other agents like iodoform, but these microbes which have ceased being noxious, may recuperate their virulence and again multiply when brought into a new culture medium which is favorable to them.

After this we think that the term asepsis, which is truer and more generic, should be preferred to that of antisepsis, and the two should not be used any longer in opposition to

each other; especially, since in many cases it is much easier and surer to attack the microbes with chemicals than with heat, as, for instance, when we have to deal with deep glandular follicles, like these of the free border of the lids, and with all natural orifices which in general are habitually infected by pathological secretion or excremental substances.

The skin of the lids and the surroundings of the orbit must have a special antisepsis, well applied. The reason for this lies in the fatty covering which reaches to a certain depth into the interior of the numerous sebaceous ducts with which they are supplied. This is especially the case with the free border of the lid where there are two rows of them, one in front at the roots of the cilia and one backwards where lie the orifices of the Meibomian glands. In order to sterilize such an area in which the microbes are, so to speak, covered with grease, we must begin by soaping the skin by means of a pledget of cotton, sterilized boiled water and soap. When this is done rub with dry cotton and make another friction with cotton very slightly moistened with ether. For the free border of the lids which, more than the other tissues, hide microbes within the orifices of the sebaceous ducts and those of the Meibomian glands, the best application is the vigorous rubbing with a pledget of sterilized cotton dipped in oleate of biniodide of mercury 4:1000, which is little irritating and an absolute bactericide, when it is allowed to act for several hours. To this end we prefer, with individuals who are to undergo a cataract extraction, to prepare this area in the evening before, to cover the closed eye with layers of gauze sterilized by heat and with a layer of borated gauze, and to apply over this layers of sterilized cotton and a bandage for fixation. All of this is to remain in place until the moment of operating has arrived.

Before proceeding with the operation the conjunctival sac way into the recesses of the tarsal fold is carefully washed out with a watery solution of mercuric salt, as mentioned above. The removal of the microbes and other impurities is not complete unless the lids are widely opened by means of a lid-holder and the fluid in the shape of a stream is forced under them from an appropriate instrument terminating in a nozzle. If there is the least suspicion of an infection of the

excretory lacrimal ducts, the washing out of these with an Anel syringe and the same mercuric fluid is to be practiced beforehand. Moreover, no operation must be performed on the eye without having treated the slightest form even of a dacryocystitis, and the same may be said about the neighboring cavities, as the nasopharynx, the different sinuses of the face, not to forget the maxillo-dental lesions, all of which may have some bad influence on an operated eye.

Schiötz, satisfied, as we are, of the importance of the antisepsis of the palpebral margin, proposes to epilate all the cilia, then to wash the skin with soap and a solution of sodium chloride 5:1000. However, so far he does not seem to have had any followers.

Needless to mention that every collyrium which is instilled into the eye before the operation must be perfectly aseptic and in condition to remain so for an indefinite period. Moreover, it must not be irritating, or as little as possible so, as this is unfortunately the case with every mercuric salt or any other germicide. Therefore, we are convinced that in this regard nothing surpasses the oily solutions of the alkaloids (cocaine, atropine, eserine, pilocarpine, etc.).

The most minute antiseptic precautions applied to the neighborhood of the field of operation constitute a condition which is indispensable for success. It is due to the neglect of this that grave post-operative complications arise, and that for a long time the absolute efficacity of antisepsis was doubted, and the bad results were put to the account of the bad state of the constitution of the patient.

We must insist that the operator and the assistants have surgically clean hands, and for this reason they must be washed with soap in sterilized water, brushed hard and dipped into a mercuric or phenic solution. All instruments, of whatever kind, must previously be immersed into boiling sterilized water to which has been added some bicarbonate of sodium, which prevents rusting. All objects used for bandaging, gauze compresses, silk threads, must be sterilized by steam of a temperature of 120 degrees for at least one-half hour, enclosed in nickeled boxes, after which a current of hot air is passed through them in order to dry them, preferably after its having passed through a receptacle with sulphuric acid so

as to clean them of dust and microbes held in suspension. The cat-gut threads are continuously kept in a solution of benzonaphtol, chloroform or any other antiseptic solution. The absorbent cotton, whether in roll or pledgets, is sterilized in tin boxes or wire baskets in the sterilizor at a temperature of 150 degrees. In order to avoid having the assistants cut or manipulate something, it is best to have the pledgets and rolls of cotton, which may be used at any moment in the ophthalmic clinics, previously cut in the proper shape, enclose them into nickeled boxes which are sterilized, as just mentioned, and which are kept always closed and from which the operator, or who applies the bandage, takes them without any intermediary. If an assistant hands them he must not touch them with his hands, but use a ring forceps which is just taken from boiling water.

I am in accord with those who, in conformity with the invariable precepts of general surgery, do not neglect to immobilize after the operation every cutaneous or corneal flap, as the only means to get a prompt cicatrization *per primam* and which permits, in cases of cutaneous or mucous membrane sutures, of removing the stitches after a very short time, three to five days at most; otherwise the stitches cut through the tissue and leave, for this very reason, ugly cicatricial bands. Rest and the immobility of the eyeball seem the more necessary to me, since here we have to deal with parts which are essentially mobile, even under a compressive bandage. Having given a spherical shape to the center of the region with a circular wall at the base, especially deep at the nasal canthus, the filling up with cotton pledgets must be done all over equally and uniformly. Therefore, we always interpose a little cotton ball of the size of a little almond in the hollow between the eye and the root of the nose between the gauze lying immediately on the closed eye and the cotton pledgets. Thus not only is the eyeball immobilized, even if it should undergo a spasm, but stronger pressure on the summit of the cornea is avoided, which would make the lips of the corneal flap gape when an operation for cataract has been made, whether with or without iridectomy, and in all cases may cause an alteration in the epithelium, which would not be indifferent should a post-operative infection arise from

the conjunctival cul-de-sacs, the ciliary border of the lids, or the lacrimo-nasal canal. Without this precaution we expose ourselves, furthermore, to a retardation of the primary reunion of the corneal flaps and in consequence of the re-establishment of the anterior chamber.

I am not unmindful of the fact that this occlusion has been accused of heating and irritating the conjunctiva and of multiplying the microbes because they are not swept away by the flow of the tears to which some try to vouchsafe germicidal properties. As far as I am concerned, I believe that closing the lids has no inconvenience, unless the conjunctiva is previously infected and inflamed, since no such thing occurs in an eye operated upon without previous infection, and what is true for the eyeball is even more so concerning the lids.

Concerning the bactericidal properties of the tears as maintained among others by Bach* and Valude, it has been absolutely denied by Ahlstroom† and Matkovic. The question therefore remains unsettled.

Aside from the operations we have to consider the accidental traumatisms of the eye as to prognosis and treatment.

Thanks to antisepsis, the treatment as well as the prognosis in these cases have enormously gained to the benefit of the patients.

Not long ago every eye gravely injured or suspected of harboring a foreign body was condemned to enucleation, which, as Warlomont and others insisted, had to be performed at once to prevent serious complications and the much dreaded sympathetic inflammation. Whenever inflammation and suppuration had invaded an injured eye the eye was enucleated.

In measure as we have progressed with the antisepsis of the injured eyes, the happy results of a conservative treatment have increased in numbers to such a point that to-day it is the base of all reasonable treatment and pursued with tenacity, whether we have to deal with an aseptic or an infected wound.

Out of 200 cases in my service at the Hôtel Dieu during

*Arch. f. Ophth., XXXIII.

†Centralbl. f. pr. Augenhlk., 1895.

the last 10 years I was forced to perform exenteration 20 times on account of plastic and purulent iridocyclitis, and not once an enucleation. Thus the ball could be preserved as to its shape and serve for an excellent prothesis. In a fifth of the cases the patients have left the hospital possessed of useful and even excellent vision. Among these latter I may cite the case of a deafmute painter of talent who had been struck into the eye, the cornea being ruptured in its whole horizontal meridian with expulsion of the lens, prolapse of the iris and a hyphæma, preventing examination of the interior. Moreover, this was the only good eye which permitted the patient to follow his profession, since the fellow eye was amblyopic since early childhood from a high degree of divergent strabismus. It is clear that on account of the deafmuteism in this case the enucleation of the injured eye had to be doubly rejected.

By means of an antiseptic treatment of which we shall speak later on, not only was this eye saved, but after three months the patient regained a visual accuity which permitted him to read, to write, and to paint as before, so that he became again useful to himself and his family.

Among the authors who are partisans of a conservative treatment I only want to cite O. Schirmer* who in a recent and exhaustive article gives a series of 133 cases of penetrating injuries of the eye, almost half of which were infected, that is complicated with iritis, iridocyclitis, a plastic or purulent, rarely, a serous hyalitis. Of these 62 cases, as far as the preservation of the globe counts, 60 per cent. of those that had fibrinous uveitis healed, 65 per cent. of those with purulent uveitis, and all three of the only three cases with serous uveitis. He made only eight immediate enucleations out of the 71 aseptic eyes, of these five in which the eyeball was burst, and two secondary enucleations of eyes having become atrophic with continued irritability, and one in which a piece of copper remained in the eye. In the cases complicated with plastic uveitis he enucleated five times, and four times in cases with purulent uveitis. To sum up, he made 17 enucleations in 133 cases. As other conservative means employed by him we may mention six optico-ciliary resections

*Græfe's Arch. 1901, LIII., p. 1–51.

on account of plastic uveitis, and three exenterations on account of suppuration.

Schirmer reports no case of sympathetic ophthalmia, and I can say the same of my 200 cases. In order to show the scarcity of sympathetic ophthalmia in our days I will add that in the last four years, among 24,000 patients recorded in my service at the Hôtel Dieu, there were but two cases of sympathetic ophthalmia, which came from the outside, one due to an injury, the other occasioned by an old irido-cyclitis with albugo of the fellow-eye. To persist in slaughtering eyes under the pretext of preventing a hypothetical, and extremely rare, sympathetic ophthalmia, means to cause a disastrous deformity for the patient and this even without safety from a consecutive sympathetic ophthalmia which may be caused by the mechanical irritation by the artificial eye and the tendency of the retrotarsal folds of becoming infected and of suppurating for a shorter or longer period.

In every injury to the eyeball the constant indication is antisepsis, be the wound recent and supposedly aseptic, or already infected. Of course, the earlier the patient is seen the greater the effect. A great many patients lose time, or are content to consult their physician before seeing a specialist who alone is in a position to use the therapeutic measures which he has always at hand and which he can apply to the best advantage on account of a long experience gained from similar cases. Forty-eight hours after the injury, everything may be changed for the worst on account of the lack of antisepsis.

Unless a foreign body is easily reached, like those lying in the corneal tissue or in the anterior chamber, or pieces of iron or steel which have penetrated deeper but which can be easily coaxed into the anterior chamber by a strong electromagnet, it is best to abstain from an immediate attempt at extraction. In the same manner we must be chary later on of performing a surgical operation in order to improve vision, as we may reawake inflammatory complications when the eye has remained injected, irritable and, especially, when painful. In a general way, it is sufficient to wait for from 3 to 6 months, according to the gravity of the lesion. Prompt intervention is indicated only when on account of an injury to the lens,

there are glaucomatous symptoms which do not yield to miotics and other means usually employed in these cases, or when there is decided danger of a sympathetic ophthalmia. There was a time when every iris prolapse, large or small, was at once excised. To-day, thanks to antisepsis, it is better to abstain and to intervene only, if necessary, at a later period when the injury is well on the road to healing. As to a simple imprisonment of the iris between the wound lips, so much dreaded formerly, it is best not to touch it or to be satisfied to cauterize the little staphyloma with electro- or thermo-cautery.

Where there is a large scleral wound with a tendency to gape, or where there is loss of vitreous body, there is a real advantage gained by stitching it with very fine sterilized silk or catgut. According to the case, the needle may perforate the sclerotic and, if necessary, the cornea, or it may suffice to stitch the conjunctiva. This method exposes less to a further loss of vitreous body.

We shall not return to the lotions and other efforts previously spoken of to assure the perfect antisepsis of the eyeball and its adnexa when injured. We want, however, to say that in these cases we must further add strong germicidal agents, especially when an infection has taken place as shown by signs of inflammation, as deep injection, chemosis, spontaneous pains and pain on pressing the ciliary ring.

In such cases we use analgesics, as cocaine, atropine as collyria, subcutaneous temporal injections of morphine and moist hot applications; local bloodlettings, by means of leeches or cupping at the temple or behind the ear which, in order to be useful, must be abundant, no fewer than 2 or 4 leeches at the time, letting the blood flow well afterwards. After this it is best to keep the patient in the dark for 24 hours.

Among the local antiseptics we have been especially gratified with methylene blue and violet 6 B, which have no caustic effect and which, thanks to their diffusibility, may reach microbes and their toxines in the depth of the tissues. The solution is 2 in 1000. Another topic which we always combine with the preceding ones is iodoform as powder and as salve with vaseline 6 to 100. From the idea that no anti-

septic vehicle equals sterilized oil I have often used in cases of plastic and purulent irido-cyclitis a collyrium of sterilized olive oil 30 grammes, methylene violet 6 B grammes 0.06, iodoform 1.5 grammes. Shake the mixture before using and instill2 to 3 drops into the conjunctival cul-de-sac morning and evening.

Cold evaporating applications and iced ones are rarely useful unless it be in purulent conjunctivitis, like that of the newly-born or in gonorrhœa in the adult. They are on the other hand absolutely contraindicated, as von Græfe has established, at first in diphtheritic conjunctivitis when the tissue of the conjunctiva is anæmic.

It goes without saying that in purulent conjunctivitis and dacryocystitis the caustic antiseptics like the aqueous solutions of silver nitrate and protargol have their place, as is universally acknowledged.

In plastic and suppurative processes in the eyeball, subconjunctival injections of chloride of sodium, mercuric salts in weak solution, trichloride of iodine and more recently methylene violet have been tried. The results have been varied and not always agreeing. This cannot be wondered at, as we do not as yet understand how so infinitesimal a quantity of the chemical agent as gets into the tissues and into the interior of the eyeball can act. In spite of this, there are cases in which the benefit is real, and we might easily explain it by some kind of revulsion due to the local irritation caused by the substance used. As their is no danger connected with their employment, we think they can be used when occasion offers.

A remedy which is more certain in its action under certain circumstances, as, for instance, suppuration of the cornea, whether this is an infected wound or an ulcer, is the red hot iron (thermo- or electro-cautery), which is heated to a dark red, not cherry red, which might attack the healthy parts in the neighborhood and cause more loss than necessary. In suppuration of the lacrimal sac nothing equals the extensive splitting of the anterior wall through skin and lateral internal ligament, followed by a copious antiseptic washing, the curetting of fungosities, if there are any, and the cauterization of the whole mucous membrane of the sac, together with the

opening into the nasal duct. After that, a drain of iodoform gauze is introduced and changed every day till all morbid secretion has ceased. When this operation is made at an early stage, when the skin is not stretched and atrophied, when there is no fistule, no deformity is left behind and all that remains is a flat linear scar, scarcely visible.

Lately Berger has proposed, when a panophthalmitis threatens, to introduce small quantities of iodoform into the eyeball in the hope of thus preventing the invasion of the vitreous body. Future experiences will have to show whether or not this is good practice.

Aside from the local antiseptics or modifiers, in cases of plastic or suppurative inflammations in the eye ball, we must not neglect the general treatment. This is the more necessary since in many cases we have to think of the influence which endo-infections, which occur more frequently than is thought, may have upon the eyeball.

Of all therapeutic agents none appears to me to be as active as mercury, since it possesses at the same time an antiseptic and an antiplastic virtue.

However, in order to act thus the mercurialization must be prompt, certain and intense. A large experience has shown me that real confidence can only be had in injections or inunctions of mercury, as the internal administration alone offers many chances, a real variability of action and often gives rise to morbid manifestations, consisting of derangement of the gastro-intestinal tract, losing of flesh and dystrophy, all attributable to the caustic action of the mercuric salts on the mucous membranes.

As inunctions expose more than the other methods to stomatitis and their therapeutic effect varies much in different subjects, as the skin is more or less penetrable and on account of other physical conditions which increase or retard the absorption of the resulting metallic vapors through the lungs, and which, as we have ascertained in a work in preparation, are of a quantity which can hardly be weighed, we give the preference with emphasis to the subcutaneous or intra-muscular injections of which those of an oily solution of biniodide of mercury 4:1000 have given us the best results with the least inconvenience to the patient. On the contrary,

by injecting one centimeter a day we have never seen a stomatitis, nor gastro-intestinal troubles, nor the least trace of albumen in the urine, while at the same time the patient took on flesh and color.

Otto Schirmer* does not only declare himself perfectly satisfied with mercury, which he gives first place in the treatment of infected wounds of the eyeball, but he gives his choice to the intra-muscular injections of biniodide of mercury in watery solution of 25 centigrammes with 2.5 grammes of iodide of potassium in 25 grammes of water. He injects a cubic centimetre, corresponding to one centigramme of the biniodide. He has found it to be absorbed rapidly and has convinced himself of the influence of the remedy on the inflammatory process after a very short time, not more than half a day. As he insists on saturating the system, he adds in the first three days of the treatment, mercurial inuctions to the injections, made with 4 grammes morning and evening in men, with 3 to 4 grammes in women, and 50 centigrammes to 1.5 grammes in children according to age. He also uses subconjunctival injections of bichloride of mercury, not as an antiseptic remedy but as a lymphagogue. He repeats the series of inunctions 3 or 4 times with diminished doses, taking care to avoid or combat the stomatitis and to sustain the strength of the patient by a substantial diet. As a complement he also recommends sweating by means of steam-baths.

I, myself, have seldom gone beyond one cubic centimeter or at most two per day of my oily solution of biniodide, each one containing four milligrammes, being convinced not only that this quantity is sufficient, but that in this way we are sure, as I said above, to produce no bad influence on the general condition of the patient.

When it became clear that more was needed I have usually added calomel by mouth which was so often employed in Mackenzie's time in the English school and has since been wrongly abandoned. I give to an adult at most 3 to 5 centigrammes per day, mixed with one gramme of powdered sugar in the form of four powders. This medicament is not only admirably absorbed, but acts also as a revulsive and intestinal antiseptic. We know what a pernicious rôle the digestive auto-

*Loco citato, p. 43.

infections play in the pathology of the eye as well as of other organs. It is certain that calomel alone has sufficed in certain cases of plastic uveitis, gummatous irido-cyclitis with hypopyon and of sympathetic ophthalmia, in arresting the progress of the disease. Yet, actually I recommend calomel only as an adjuvant and I say the same of inunctions of blue ointment which in its action is variable, reserving, as I said, first place to the intramuscular injections of biniodide of mercury in oily solution which I make with preference in the gluteal region.

I need not say that the serum-therapy constitutes a most efficacious therapy against every microbic infection, as has been proven in diphtheritic conjunctivitis. When we have to deal with streptococcus infection Marmoreck's serum can be used, to which we personally owe the cure of a double orbital trombophlebitis, due to a suppuration of the ear and the neighboring cervical ganglions in which the pus contained only streptococci.

Very recently Roemer, inspired by the antitoxic action of injections of the serum of rabbits in which had been caused a conjunctivitis by means of abrine*, has proposed the use of a pneumococcic serum† in the treatment of serpiginous ulcer of the cornea, which, as is known, is in most cases due to the pneumococcus alone or associated with other microbes.

To the subcutaneous serum injections instillations into the cul-de-sac should be added as it has been done with the abrinized serum by Calmette‡ & Delarde, and then by Calmette§ & Lapersonne.

For all cases of infection in which the serum-therapy is not in place, we should try to free the organism from the microbes and their toxines by the natural ways of excretion, the gastro-intestinal tract, the kidneys and the skin; hence the usefulness of purges, diuretics and diaphoretics, not to forget keeping the patient in pure air, the action of which on the tubercle bacillus need no longer be demonstrated, then tonics and reparatives.

Aside from their therapeutic value the antiseptics play a

*Arch. f. Ophth., 1901, LII., p. 72.

†Arch. f. Ophth., 1902.

‡Annales de l'institut Pasteur, 1896.

§Congres international de Médicine, Paris, 1900.

very important rôle in the prophylaxis and ocular hygiene which comes into play especially concerning damaged eyes, such as have been previously injured or have corneal opacities with or without staphyloma or those with chronic blepharo-conjunctivitis, habitual lacrimation from ectropium or catarrh of the sac. All of these conditions render the eye less resistent and favor the rapid increase of microbes in the cul-de-sacs and crypts of the conjunctiva, as well as, in the orifices of the numerous glandular ducts with which the free borders of the lids are supplied. Aside from washing out twice daily with boiled sterile water, we must add according to necessity boric acid, biborate of sodium, chloride of potassium, which has given me good results, and when there are traces of suppuration or only abundant mucoid secretions more potent modifying solutions, as the salts of zinc, lead and silver in weak concentration, not to forget permanganate of potassium, naphthol, and others.

In order to be active solutions must be used in abundance and should be made with cotton balls or, better, with a glass injector, which is directed into the cul-de-sacs while the lids are widely opened. The eye-baths, as yet frequently recommended, must be looked upon as insufficient and, moreover, they may carry an infection from one eye to the other.

As the most deleterious affections, like the blennorrhœa of the newly-born, the gonorrhœa and the secreting granular ophthalmia are due to a contagium, we must use all possible means to destroy this. This is the more necessary, as statistics show plainly that one third of the blind owe their blindness to these three sources, while the remainder are due to injuries of all sorts, deep-seated ophthalmias, glaucoma and atrophy of the optic nerve.

The blennorrhœa of the newly-born which in itself furnishes one-fifth of all the blind of all ages and of all origin, can be avoided if, before the confinement, the purulent vaginitis which is so frequent in pregnant women is treated by germicidal vaginal injections. Since a contamination is possible, in spite of this, during the passage of the fœtus through the valvo-vaginal canal, the eyes of the newly-born must be washed with antiseptic solutions, solutions of mercuric salts and instillations be made into the cul-de-sacs of a 1 or 2 per

cent. nitrate of silver collyrium as is the method of Crédé. This latter method which has proven very successful, has reduced blindness from blennorhœa neonatorum from 8 and 10 per cent. as before antisepsis, to one-half per cent. Other agents have since been proposed but have been less favorable in their action.

In order to avoid all infection after the birth perfect cleanliness must be obtained, comprising the hands, all objects and linen for the toilet, for which it is better to substitute absorbent cotton to wash and wipe the eyes with.

Gonorrhoic ophthalmia calls for the same minute precautions, and, what is more, the patients must never touch the eyes with the fingers without having brushed and washed them with soap whenever they have touched the genital organs as, for instance, when urinating and arranging the shirt which is but too often soiled with the gonorrhoic discharge. The so-called metastatic purulent conjunctivitis is a very doubtful affair, whilst direct contagion of the eyes is the absolute rule. Therefore, we must instruct all those who take care of infants with blennorrhœa, or who live with a gonnorrhoic, that, since these affections may be transmitted from one individual to another, they must avoid all direct or indirect contact, being careful of the water, the hands, the linen and other toilet articles.

Supposing one eye has already been affected, it should be carefully covered with a watch-glass glued all around the orbit with Unna's paste, collodion cotton or any other non-irritant adhesive, for fear the other eye might also be infected from the first one. Luckily the second eye most frequently escapes infection or the infection is late and less virulent, which contrary to the blennorrhœa neonatorum, makes the occurrence of bilateral blindness less likely.

The contagiosity of granular conjunctivitis can not be doubted, but with this restriction, that contagion occurs chiefly during the acute stage of purulency when the disease should be attacked by all the hygienic and preservatory agencies mentioned above. Living in narrow, badly ventilated quarters and physiological misery, including lymphatism, are the incontestable conditions for its propagation. Low and moist habitations have been especially accused, since the dis-

ease is said to be much rarer and to disappear in high altitudes, as in Switzerland, which was cited as an example of the scarcity of this disease. Brusch of Algier, in a very exhaustive paper, read at the International Congress, 1900, and published in the Arch. d'Opht., has shown that these conditions are not of the same importance in Algier and that uncleanliness and contagion constitute the two principal factors in propagating granular conjunctivitis. We may add that what is true in Algier is the same in Egypt and certain parts of North America, as for instance in Illinois, which on that account is called little Egypt.

Frightened by the number of blind people which would be caused by a diffusion of the granular conjunctivitis, the Government of the United States, induced by Miles Standish* of Boston, takes prophylactic measures against the immigrants from the old continent by exacting from them a certificate of immunity both from the port of departure and of arrival. Since this measure has been introduced in June, 1899, the proportion of trachomatous individuals has been reduced almost one half, so that in New York and the other Eastern States it is 2.71 per cent. instead of 4.25 per cent., and 6.57 per cent in Illinois, where formerly it was 8.79 per cent.

In agreement with these figures, bilateral blindness from trachoma in the hospital of the blind at Jacksonville, Ill., is 9.9 per cent., while in the State of New York it is only 4.02 per cent.† We have to add to these figures, as Davies‡ has observed in an excellent paper, those who have lost one eye only, or whose vision has been rendered defective by pannus with trichiasis and entropium which may go on to xerophthalmia and symblepharon, not to forget staphyloma, or at least cause irregular astigmatism, and conditions which occur under the influence of future microbic infections, end in ulcers of the cornea, panophthalmitis or phthisis bulbi, and especially glaucoma absolutum. That is the reason for Wilder's§ statement that aside from gonorrhœa and atrophy of the optic nerve, trachoma causes more blindness than all other eye affections together.

*Massachussets Medical Soc., 1897.

†L. Howe, xxviii, Report of the New York School for the Blind.

‡Post-Graduate. 19(2. p. 538.

§Ophth. Record, Nov. 1901.

We all know how many victims were attacked by the importation of trachoma into Europe at the time of the wars of the first Empire in Egypt, so that the disease since then has been called the Egyptian ophthalmia or, after the Belgian ophthalmologists, military ophthalmia.

Fróm this follows the necessity of the hygienic measure to inspect the workingmen in factories, the children in school and in the community, the recruits in the army, the prisoners, and domestics in general, in order to destroy at once each focus of infection, according to the principal that it is easier and more certain to prevent trachoma than to treat it, which is tedious and not always certain of cure.

Aside from the contagium of the microbes and their toxines, from a standpoint of the hygiene of the eyes we have still to consider the syphilitic and gonorrhoic endo-infections, which are only too frequent and the bad action of which influences all parts of the ocular apparatus including the sensory optico-retinal part, the cause of a great many cases of blindness from atrophy, among which tabes holds first place, besides blindness from gumma and protracted inflammations of the uveal tract and the sensitive and motor paralyses.

It is well known how much the prophylaxis of these two avoidable affections and of the blindness caused by them at this period concerns the syphilographers, the hygienists and the sociologists. It is the physician's part to recognize the origin of the disease, to attack it at its base and as soon as possible with local and general therapeutic agents which should be as accessible as is possible to the patients, teaching them the dangers they run and which they inflict on others and on society, and for this reason certain social duties which they must not overlook, especially since the disease is transmitted from father and mother to the child.

We should say the same about the intoxications in certain trades, as by lead, carbon sulphide, etc., and those voluntary ones by alcohol and tobacco, all of which may be avoided by conforming with the advice of the physicians and hygienists. Here the ophthalmologist is also called upon to prevent and combat the blindness which may result.

A final source of more or less grave affections of the eyes which may lead to loss of vision, is the lack of protection

against insults of a physical nature from the outside, as light, intense heat, and cold; or of a mechanical nature, as mere dust in the air and up to small foreign bodies which may be pricking, cutting or contusing and the action of which may vary from a simple scratch to penetration and tearing of the eyeball.

All things being equal, the affections resulting therefrom in the eye are considerably aggravated if the wounding foreign body was previously infected, or when the conjunctiva and the lids harbor pathogenic microbes, and when the cornea of the eye concerned has lost its sensitiveness or is constantly exposed to the air on account of cicatricial ectropium, paralytic lagophthalmus or some form of exophthalmus.

The defense in similar cases lies in the recommendation of protecting means, like the habitual wearing of glass or metallic gauze spectacles, which every workman whose work exposes him should wear obligatorily. This should be insisted upon by his employers who are legally liable for his injuries.

Another recommendation is to at once seek the aid of a specialist who, acting sooner, may obtain a cure and prevent disaster, while when called upon later he may be unable to do so.

In fact we must be pervaded by the idea and must teach this to the public that the great weapon against injuries which we possess to-day, lies in an immediate and thorough antisepsis.

MEDICAL SOCIETIES.

PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.*

W. Lang, F.R.C.S., Senior Vice-President, in the Chair.

Thursday, January 29, 1902.

Hyaline Bodies at the Optic Disc.

Messrs. A. Stanford Morton and J. Herbert Parsons read a paper upon hyaline bodies (*Drusenbildungen*) at the optic disc, with drawings and notes of two cases and lantern slides. Out of 42 cases in the literature, seven had retinitis pigmentosa, others were associated with injury, nervous disorders (from simple headache to chronic hydrocephalus and insanity), and chronic interstitial nephritis, but a large number of patients were normal, with normal vision. The condition usually commenced in early life, and was extremely chronic. In nearly all cases both eyes were affected, but often unequally. The prognosis was good. The pathological anatomy of the condition was discussed, and various allied conditions demonstrated. It was shown that *Drusen* were not ordinary colloid bodies, such as are found upon the choroid, though these too might occur near the disc. Exudates similar to the hyaline nodules might become metamorphosed into true bone, such as was frequently seen in the choroid in shrunken globes. The fate of exudates in the disc and in other parts of the eye, and its dependence upon environment, were discussed.

Primary Extradural Tumors of Optic Nerve.

Mr. J. Herbert Parsons read a paper on primary extradural tumors of the optic nerve, with clinical and pathological notes of a case illustrated by lantern slides. There were 18 cases on record as compared with 102 cases of primary intradural cases. The disease usually commenced before the age of 10 years, and the prominent symptom is exophthalmos, the protrusion being most marked in the axis of the orbit. The failure of vision was slow, slower than with intradural tumors,

*British Medical Journal.

and was accompanied by optic neuritis of the "choked disc" variety, to be followed by postneuritic atrophy. Later changes in the eye resulted from lagophthalmos. In no case was the globe invaded by the growth. Eight of the growths were undoubtedly endotheliomata, several having the characteristics of psammomata. The fibromatosis present in most cases was a feature of importance. The growths were slow and of relatively low malignancy, giving rise neither to glandular dissemination nor to metastasis. Considering this fact and that the point of danger was at the apex of the orbit, Krönlein's operation, with retention of the globe, was indicated wherever possible.

TUMOR OF THE OPTIC NERVE; KRÖNLEIN'S OPERATION.

MR. L. WERNER reported two cases of this condition and referred to another under the care of Mr. Swanzy.

The first, a woman of 45, noticed swelling of the inner canthus for one year before coming under observation. When seen the left eye was two centimetres in advance of the right and directed downwards; there was no pulsation or *bruit*, and though the eye was blind the patient was unaware of it. The eye was anaesthetic, tension normal, and there was marked optic atrophy seen through the clear media. Tumor of the optic nerve was diagnosed, and it, with the optic nerve, was removed by Krönlein's method, the eye being left in its place. A semicircular incision with the convexity forwards and extending to near the outer canthus was made exposing the outer wall of the orbit. The bone was removed as widely as possible by dividing it with a chisel at the external angular process of the frontal and just above the zygoma, extending the incision backwards to the spheno-maxillary fissure and turning the mass back with the soft parts. The tumor was then isolated and removed; there was a clear portion of optic nerve in front, but posteriorly the growth extended into the apex of the orbit and required removal piecemeal. There was some hæmorrhage, causing temporary protusion of the eyeball after replacement of the flap. No sutures were put in the periosteum and no drainage tube was inserted. The lids, which were temporarily attached, became œdematous, but on removing the dressing on the fifth day union was complete, and though anæsthesia of the globe persisted, the eye

assumed a normal appearance, and movements, except lateral, were free. The tumor, enclosed in the dural sheath, was an alveolar sarcoma; the grouped cells being arranged concentrically, suggested endothelioma. The second case was a girl of 11, whose eye for fourteen months had been prominent and divergent. The eye was removed with the growth, the inner aspect of the lid was scraped and the orbit cleared out. The growth proved to be a myxosarcoma surrounding the nerve which had entirely degenerated.

Krönlein performed this operation first in 1886 and published account in 1889. It was not difficult and had many advantages. The wedge of bone freed should be as large as possible, and the division of the outer orbital plate should be accomplished before completely freeing the anterior part to avoid splintering. The risk was practically *nil;* of 73 cases one only had died. The limitation of lateral movement was temporary only and in cases where the nerve was not involved sight might be preserved.

Formation of Bone in the Choroid.

Dr. Thomas Snowball read a paper on the formation of bone in the choroid. Notes were given of a series of seven cases in which ossification had taken place in eyes that had become blind and shrunken as the result of old perforating injuries or long-standing inflammation with or without perforation. In the choroid a chronic inflammation with plastic exudation was set up, leading to degenerative changes in the various layers of this coat; the outer pigmented stroma became more or less fibrous, the inner layers, the chorio-capillaris, and membrane of Bruch were to a large extent replaced by fibrous tissue which had become organized from the exudation poured out towards the inner surface of the choroid. In this fibrous tissue the bone had developed. At the areas of bone formation the chorio-capillaris when present was never a continuous layer, but was represented by only a few vessels here and there. The lamina vitrea, when seen, near the focus of bone, was never found external to it. This was contrary to the observations of Brailey, Fontan, and others, who described cases where the membrane of Bruch was seen as a distinct line external to the plate of bone. In most of his own cases the bone formed a layer in the usual situation,.

namely, around the optic nerve entrance. In one case where colloid bodies were undergoing ossification, the bone in the choroid had evidently arisen independently of them, and was a more advanced stage of development. In none of the cases was there a trace of sympathetic disease in the other eye. From a study of his own cases and those described by Knapp, Whiting, Legrange, and many others, it was concluded that ossification in the choroid arose most commonly in fibrous tissue developing in the chorio-capillaris, and either replacing it or lying immediately external to it.

Card Specimens.

The following were shown: Mr. L. Werner: Coloboma of the optic nerve.—Mr. F. A. C. Tyrrell: Congenital malformation of the lower eyelids.—Major M. T. Yarr, R. A. M. C.: Changes in the macular region following contusion of the eye.—Mr. E. Treacher Collins: A case of favus of the upper eyelid.—Mr. Holmes Spicer: Sections from nævus of the orbit.—Mr. J. H. Fisher: Aneurysmal dilatation of the retinal vessels in a boy suffering from heart disease.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

THE DECENTERING OF LENSES FOR NEAR WORK.

G. C. Savage (*Journal American Medical Association*, Nov. 22, 1902), thinks that very good results can be obtained from the proper decentering of lenses; providing the prismatic effect is not too great. The maximum vertical prismatic effect should be placed at 1 to 2 degrees and the lateral at 2 to 4 degrees. In the majority of cases the prismatic effect should correct about one-half of the manifest error. The full correction, especially of a small vertical error, is at times worn with comfort. The objection to prisms is, that it frequently interferes with the "visual judgments," and for this reason the author thinks that it is better to cure muscle errors of low degree by proper prismatic exercise; those of high

degree should be treated surgically. He submits the following rules:

1. If there is orthophoria, presbyopic lenses should be properly centered, that is, they should be so placed that each visual axis will cut the optical center of its lens, when a point of fixation is in the extended median plane of the head. On changing the point of view in any direction, without moving the head, the prismatic effect would be the same in kind for each eye, and if the lenses are of equal strength, the degree of prismatic effect would be the same for each eye. The lenses for such eyes should never be so placed that both visual axes would cut them on either the nasal or temporal sides of the optical centers. With safety, and in some cases with positive helpfulness, the lenses may be so placed that the visual axes would cut them directly above the optical centers. As can be readily seen, this would take some work off the subvertor muscles, thus lessening the demand on the second and sixth conjugate brain centers. But orthoptic eyes will not take kindly to presbyopic lenses placed so high that the visual axes would cut them below the optical centers, for this would create an abnormally large demand on the two centers mentioned.

2. If there is uncomplicated esophoria, both presbyopic lenses should be decentered directly out, and to an equal extent, so that the two visual axes may cut the lenses to the nasal side of their optical centers, thus favoring the weak externi. This can be accomplished equally as well by making the frames wider than called for by the pupillary measurement. If the interni are properly attached, the compensating esotropia will be attended by relief, but if attached too low the compensating esotropia would develop a plus cyclophoria that might bring great discomfort. To decenter lenses in, or to have the frames narrower than called for by the pupillary measurements, for such eyes, would render the lenses more or less unbearable.

3. In esophoria complicated only by hyperphoria of one eye and cataphoria of the other, the decentering of presbyopic lenses should be confined to the lens for the hyperphoric eye, and should be down-and-out, so as to develop a compensating eso-hypertropia of this eye. To decenter the lens out-and-up

for the cataphoric eye would result in developing a plus cyclophoria, to correct which the superior oblique would be forced into a state of abnormal tension. Slight abnormal tension is well borne by the inferior oblique, but not by the superior oblique.

4. In esophoria, complicated by hyperphoria of one eye and cataphoria of the other, with plus cyclophoria, the decentering of presbyopic lenses should be confined strictly to the lens for the hyperphoric eye, and should be down-and-out, so as to develop a compensating eso-hypertropia. The rotation in-and-up, made necessary by the prism displacement, generates a minus cyclophoria which, in such a case, would neutralize the existing plus cyclophoria, thus enabling the superior oblique to easily parallel the vertical axis of the eye with the median plane of the head. In such a case the evil effect of decentering the lens out-and-up, for the cataphoric eye, comes from the compensating eso-catatropia, and is due to the plus cyclophoria that is thus generated. There being already a plus cyclophoria which the superior oblique must correct by being kept in a state of abnormal tension, the added artificial cyclophoria can do nothing but augment the discomfort of the patient.

5. In simple exophoria each presbyopic lens should be decentered directly in and to an equal extent, or what would be the same in effect, the frames should be made narrower than would be indicated by the pupillary measurement. This would develop a compensating exotropia, and the lenses would be well borne if the externi have ideal insertions or if their insertions are lower than normal; but if their insertions are higher than normal the lenses thus decentered would not be well borne for the reason that the compensating exotrophia would develop a plus cyclophoria. Presbyopic lenses, in frames that are wider than indicated by the pupillary measurement, can not be borne by an exophoric.

6. In exophoria complicated by hyperphoria of one eye and cataphoria of the other, the decentering of presbyopic lenses should be confined to the one for the cataphoric eye, and should be in-and-up. This would develop a compensating exo-catatropia; that is, the eye would be rotated out-and-down. Every such rotation of an eye develops a minus

cyclophoria which the inferior oblique can correct easily. Decentering the lens in-and-down, for the hyperphoric eye, would cause a compensating rotation out-and-up, which would develop a plus cyclophoria, the correction of which would not be easily borne by the superior oblique.

7. In exophoria complicated by hyperphoria of one eye and cataphoria of the other, with plus cyclophoria, the decentering of the presbyopic lenses should be confined strictly to the one for the cataphoric eye, and should be in-and-up. The compensating exo-catatropia, that is, the rotation out-and-down, would develop a minus cyclophoria which would more or less completely neutralize the existing plus cyclophoria. To decenter the lens for the hyperphoric eye in-and-down would cause a compensating exo-hypertropia, that is, a rotation out-and-up. This would develop artificially a plus cyclophoria which, grafted onto the plus cyclophoria already existing, would only add to the discomfort of the sufferer.

8. In hyperphoria of one eye and cataphoria of the other, with or without plus cyclophoria, the decentering of presbyopic lenses should be confined to the one for the hyperphoric eye, and should be directly down. There would be caused a compensating hypertropia. This would develop a minus cyclophoria which the inferior oblique would counteract readily. To decenter the lens directly up for the cataphoric eye would cause a compensating catatropia which would develop a plus cyclophoria not easily correctible by the superior oblique. The trouble with such a lens would be emphasized if the artificial plus cyclophoria should be grafted onto an existing plus cyclophoria.

9. In double hyperphoria uncomplicated, both presbyopic lenses should be decentered directly down, and to an equal extent; or, what would be the same in effect, the nose-bridge should be made deep enough to allow the visual axes to cut the lenses above their optical centers.

10. In double cataphoria uncomplicated, if any decentering should be done at all, it should be directly up.

11. If there is plus cyclophoria only, in a presbyopic case, both correcting lenses should be decentered down.

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ORIGINAL ARTICLES.

INTRAOCULAR INJECTIONS OF STERILIZED IODOFORM INTO THE ANTERIOR CHAMBER IN TUBERCULAR IRITIS.

By N. J. WEILL, M. D.,
PITTSBURGH, PA.

TUBERCULAR Iritis is fortunately a comparatively rare disease. Until recently it has entirely baffled the oculist's skill. All visible tubercular portions of the iris have been excised only to be followed by the process recurring in another part of the iris. To *Haab*[1] we are indebted for the results of experiment and treatment of such cases with intraocular injections of sterilized iodoform. That remarkable effects are produced by this treatment the history of the following case shows:

October 11, 1901.—Wm. J. H., 21 years of age, of Oakmont, Pa., is led into my office. He had been employed as a marker or letterer of structural iron in a mill. Early in April, 1901, his eyes became red and his sight *failed rapidly*. In 10 days they became so weak, that he could not even find his way to work. They did not pain him. His family physician pronounced the affection to be "pink eye." He prescribed eye-drops and in the beginning warm, later cold applications. After thus being treated two weeks and his vision becoming

weaker, he was brought to this city to an oculist. The latter prescribed eye-drops, mercurial inunctions, iodide of potassium, and had leeches applied to the temples. This treatment was continued without any apparent improvement, from the latter part of April until about one week before the patient was brought to me.

General Appearance:—Patient is tall and slender and appears anæmic. *History:*—He claims his health has always been good. Has been married about one year. They have one healthy child. No syphilitic or tubercular history obtainable nor manifestation of the same discoverable.

Examination of Eyes.

Right Eye.—Moderate ciliary injection. Tension normal. Cornea, particularly the naso-central portion, vascular and opaque. A few grayish deposits on Descemets' membrane. Pupil small, immovable and covered with exudate. Iris bluish and in its ciliary portion a number of small prominent grayish nodules. Vision limited to ability to note the direction of shadow before eye. Projection normal.

Left Eye.—Picture much like right eye. Tension normal. Less ciliary injection. Cornea less vascular and fairly clear around a large temporal central anterior synechia. No deposits on Descemets' membrane. Circular posterior synechia. Entire iris seems adherent to lens capsule. Many small grayish nodules in iris. Vision about the same as with the other eye. Ordered instillations of a 1 per cent. solution of atropin sulphate into each eye daily.

October 18, 1901.—As the right pupil seemed a little larger, so under cocaine anæsthesia, I attempted an iridectomy from the temporal side, but the iris was so firmly attached to the anterior lens capsule that it was unsuccessful. Believing iodoform would have a favorable effect on the tubercular process, I then introduced considerable sterilized iodoform[2] with a spatula[3] into the anterior chamber.

October 23, 1901. Right Eye—Severe reaction. Intense iritis and ciliary redness. Entire cornea hazy and vascular.

October 24, 1901. Left Eye.—I attempted an iridectomy from the nasal side, but only succeeded in excising

from their adhesions twô small separate pieces of iris, the one at the pupillary, the other at the ciliary margin—the intervening iris was firmly adherent to the lens capsule. I then put as much iodoform into the anterior chamber as possible.

November 1, 1901. Right Eye.—Cornea is clearing up very slowly.

Left Eye.—Tension normal or slightly reduced. Considerable iritis. Counts fingers held just in front of eye. Atropin is being used freely in both eyes.

November 14, 1901. Right Eye.—Inflammation subsiding. Iodoform appreciably lessened in amount. Nodules in the iris appear smaller.

Left Eye.—Iodoform diminishing. Cornea clearer. Can discern which finger of hand is held before eye. Projection is uncertain.

Not anticipating any further improvement, hoping only that the little vision gained might be permanent, I advised his attending the Institution for the Blind to learn a trade, also the continued use of an atropin ointment, (1 per cent.) every evening in each eye, and a tablespoonful of cod-liver oil after each meal.

February 20, 1903.—Patient returns to have glasses adjusted. He is healthy and much heavier. He says his vision improved slowly until June, 1902, when he left the Institution for the Blind. Since then his vision has remained practically the same.

He goes about without any assistance and follows his trade, broom-making, advantageously. *With either eye he counts fingers at seven feet; with both eyes fingers at fully eight feet, He reads the head lines in the daily papers.*

Examination.—Both eyes are quiet. Each has a large central corneal opacity with the iris adherent to the same—in the right eye more than in the left. Tension normal. No deposits on Descemets' membrane, nor nodules visible in the iris. With the magnifying glass (loupe) many narrowed blood-vessels are seen in the cornea and iris. Directly upward both pupils seem slightly movable. No exudate can be seen in the right pupil. Before the right eye he sees "movable clouds" (vitreous opacities).

Believing the process to be tubercular and not syphilitic, I attempted the iridectomies. The partial iridectomy having remained as made, and the plastic exudations in the pupil, etc., having disappeared to a considerable extent, tends to confirm the diagnosis of tubercular iritis.

In the near future I hope again to attempt an optical iridectomy in each eye.

It would seem the favorable result obtained in this case and the improvement *Haab* and *Ammann* noted from their observations, warrant further application of this method in the treatment of supposedly[4] tubercular iritis.

REFERENCES.

[1]*Ammann* (Assistant to Prof. Haab). Zur Iristuberculose. Klin. Monatsbl. für Augenheilkunde. May, 1897.

Weill (Assistant to Prof. Haab.) The introduction of iodoform into the anterior chamber of the Eye in Tubercular Iritis.—Archives of Ophthalmol., Vol. XXXVIII, 2. 1899.

Knur. Ueber die intraoculære Iodoform—Desinfection nach Prof. Dr. Haab.. Inaugural Dissertation. Zürich, 1901.

Haab. Ophthalmologische Mittheilungen. Correspondenz—Blatt f. Schweizer Aerzte, 1902, Number 8.

[2]Method of sterilizing the iodoform:—Place the iodoform in a 3 per cent. solution of carbolic acid for 48 hours. Pour the acid off. Plug the receptacle with sterilized cotton; put it in an oven with a constant temperature of 40° C. to dry.

[3]The iodoform used at present by Prof. Haab is prepared by his private assistant, Dr. Sidler-Huguenin, with sterilized gelatine, in the form of small, round bacilli or flat discs. Vide *Knur* loc. cit., page 12.

[4]I was not in a position to confirm my diagnosis by a complete bacteriological examination. I have preserved the excised iris from the left eye in 95 per cent. alcohol.

PAMPHLETS RECEIVED.

"Portland Medical Club, 1876–1902."

"The Misuse of Glasses," by F. C. Hotz, M.D.

"Paraffin Injections in a case of so-called Saddle-Nose," by F. Alter, M.D.

"Blindness from Congenital Malformation of the Skull," by Ch. A. Oliver, M.D.

"A Modification of Gersuny's Method of Paraffin Injections, Etc.," by F. Alter, M.D.

EPISCLERITIS AND SCLERITIS.*

BY ADOLF ALT, M.D.

WHEN deciding to bring before this Association the subject of episcleritis and scleritis, I was aware of the fact that it is not a very enticing subject. These diseases belong to the class of which we know as yet but very little outside of their clinical picture, and in which, in consequence, our therapeutic efforts are chiefly empyrical, and, though sometimes crowned by apparent success, are in the majority of the cases utterly unreliable, not to say useless; perhaps, sometimes even harmful.

I was also aware of the fact that I could not add anything very new or striking to the knowledge of these diseases, but I hoped that by treating the subject more or less in the light of the results of my own experiences with it, I might induce others to detail theirs, and that, perhaps, after all, this sterile field might be rendered fruit-bearing.

When looking through the many and more and more swiftly multiplying text-books it seems that one copies from the other with little or no addition from personal experience, especially as concerns the subject of this paper, and our knowledge concerning it has of late not been enhanced to any appreciable extent.

The clinical picture of episcleritis and scleritis is so well known to all of you that I need not take up too much time in detailing it.

We may clinically differentiate between superficial episcleritis and scleritis, and a more deeply seated scleritis.

In the superficial form one or several foci of inflammation are visible under the bulbar conjunctiva. These form characteristic roundish red, or reddish-blue elevations, covered by congested conjunctiva. This conjunctival and episcleral congestion may be confined to the seat of the swelling and a few vessels supplying its area, or it may be more general in character. The elevated nodule is in most cases more or less solid and feels rather hard to the touch, but I have also seen a number of cases in which during the progress of the disease elevated spots were formed which looked exactly like

*Read at the meeting of the Academy of Ophthalmology and Oto-Laryngology held at Indianapolis April 9th to 11th, 1903.

large phlyctaens, semitransparent and as if filled with a muddy yellowish liquid. The nodules cannot be moved on the sclerotic. Pressure on them, which is usually quite and sometimes extremely painful, may empty the superficial conjunctival blood-vessels, but not those lying in the depth, nor reduce the swelling.

Such a nodule may disappear and consecutively more nodules may spring up, and it may happen that this nodule-formation travels gradually all around the periphery of the cornea.

The seat of the nodules is either quite close to or but little removed from the periphery of the cornea, or farther back near the aequator of the eyeball. In a general way, though not without exception, their seat seems to be near the places where larger blood-vessels pierce the sclerotic.

When the nodules are formed very close to the periphery of the cornea this membrane is frequently seen to suffer also. I have seen typical marginal ulcers of the cornea thus formed corresponding to the seat of the episcleritic nodule. In other cases, and this happens more frequently, an infiltration into the deeper corneal tissue takes place, which gradually leads to the formation of new tissue, and consequent sclerosis of a localized peripheral part of the cornea.

In some cases the eruption causes little or no discomfort, even though it gradually invade quite a large area of tissue. In most cases, however, there is spontaneous pain and great discomfort and the eyes cannot be used for any work.

This is the more unfortunate since the disease, in the majority of cases, attacks both eyes, although I have seen it in quite a number of cases to remain confined to one eye only.

During its springing up, growth and disappearance such a nodule never shows any signs of superficial or deeper necrosis and no ulcer results from it. When the affection heals, with or without treatment, the swelling becomes gradually reduced in size, till it finally disappears, and usually together with it the congestion which had accompanied it. In other cases the congestion remains behind and new abortive attacks can still be recognized by a sudden localized increase of congestion, although no swelling appears, till finally, like distant lightning after the storm, even this fades out.

The seat of a former episcleritic nodule may then show no trace of having been disturbed. In most cases, however, and especially in the more prolonged ones and those in which the nodule was situated near the aequator, a grayish-blue or grayish-violet spot marks the site of the former infiltration for life.

The course of the disease is pre-eminently slow, and with the continually renewed eruptions it may cover many months and years. I have at this time a patient under my observation, in whom the disease made its first appearance nineteen months ago, and at this date is far from being cured.

The disease is usually seen in adults, yet sometimes it also appears in young children. It seems to attack individuals of the female sex oftener than those of the male sex. In some cases I have noted a decided influence of the female sexual sphere on the course of the disease, as it showed exacerbations with every menstrual period. Negroes are often subject to it.

The clinical picture of the deeper-seated scleritis is a different and more varied one, according to the area involved and its complications, and its sequels are of a much more deleterious character. It has always seemed to me that this is an essentially different affection, although its symptoms in certain cases and at a certain period may in a measure be similar to those of superficial episcleritis. When the deeper parts of the sclerotic in the anterior half of the eyeball are inflamed we may, also, see an isolated elevation of the sclerotic of bluish-red tint, covered by congested conjunctiva. This elevation usually covers a larger area than in episcleritis. It is in some cases seen to form a bluish elevated ring around the periphery of the cornea, close to it or more over the region of the ciliary body. When the disease, as it undoubtedly does, attacks the sclerotic farther back and near the posterior pole of the eyeball, we can, of course, not see it.

Such deeper seated scleral infiltrations may also gradually disappear like the superficial ones, without leaving a mark behind. Yet the rule is that when such a nodule has disappeared we find in its stead a bluish-gray thin area in the sclerotic, to which the uveal pigment gives a peculiar color. This thinned out area is too weak to withstand the normal,

and much less an increased, intraocular pressure and the result is a more or less localized staphyloma. If the disease had attacked the circumcorneal tissue this whole area becomes stretched and the result is the annular staphyloma which used to be termed "Intercalar Staphyloma." In the same manner ciliary and aequatorial staphylomata, as well as more posteriorly situated ones, and a total scleral staphyloma may result.

This form of scleritis is in my experience always combined with a more localized or general affection of the uveal tract. While the question remains which of the two membranes is the first to be attacked, my opinion is that the uveal tract is, as a rule, first diseased and the sclerotic secondarily.

Deep-seated scleritis is more frequently observed in very young children, although it may also be met with in adults.

The course of the disease with its sequelæ is much longer than that of the superficial episcleritis.

Fuchs (and before him some English authors) has described a third form of episcleritis, to which he gave the name of episcleritis periodica fugax. The symptoms of inflammation in this form are said to be slight and of short duration, although recurring again and again, so that this affection also may extend over years. It is said to be a very rare form, and I have never seen it.

If we now inquire into the etiology of these affections we find an astonishing unanimity among the authors of textbooks. A rheumatic diathesis always heads the list of etiological factors, and some authors go so far as to state that they have hardly ever seen a case of episcleritis that could not be explained by a rheumatic diathesis. I must differ very materially from these authors. In my experience cases of episcleritis in which a history of former rheumatism in whatever form could be elucidated, or in which a rheumatic diathesis was present at the time, have been but very few indeed. But I confess I am in decided need of information as to what the authors exactly mean by rheumatic diathesis.

Next to rheumatism a gouty diathesis is most frequently accused. A gouty or uric acid diathesis has of late attained such a prominence in the explanation of all sorts of affections that it is not to be wondered at that it may also cause epi-

scleritis. I have signally failed in my cases to convince myself of any gouty diathesis, and while I know a great many individuals who are undoubtedly afflicted with the so-called uric acid diathesis, not one of them has ever, so far as I am aware, suffered from episcleritis.

That acquired syphilis may once in a while cause a typical episcleritis has been proven by Alexander not only from his own observation but also from previous literature (Coccius, Jacobson, Arlt, Mooren, Galezowski and Higgens).

Tuberculosis and scrophulosis are also mentioned, as is hereditary syphilis. Perhaps these affections play as im-

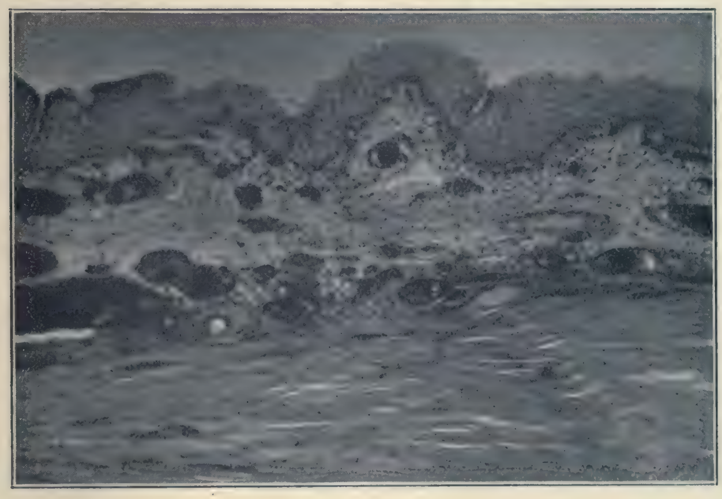

FIG. 1.

portant a rôle, or even a more important rôle in the etiology of at least the deep scleritis, if not the superficial one, than either rheumatism or gout. This may be, and I think it is, especially so when the disease is found in young children.

Still, in summing up my clinical experience with these affections of the episcleral and scleral tissue, I must confess that in most of the cases I have been utterly unable to convince myself of a general diathesis which might underlie this local affection, even though certain so-called specific remedies seemed to, and for the time being did, exert a beneficial influence on its course, and the diagnosis of the diathesis might have appeared as proven *ex juvantibus*.

In this general uncertainty we might hope to gain some special insight into the mysteries of the affections we are here considering by the study of their pathology. Yet, eyes with superficial episcleritis have, from the nature of the disease, but very rarely and only, so to speak, by accident reached the pathological laboratory, those with a deeper-seated scleritis, while much more frequent, are usually seen when the most active stage has long been passed and only its sequelæ can be studied.

The following is a resumé of what has been seen: Superficial episcleritis and scleritis (because the two are always found together) has been studied especially by Uhthoff and

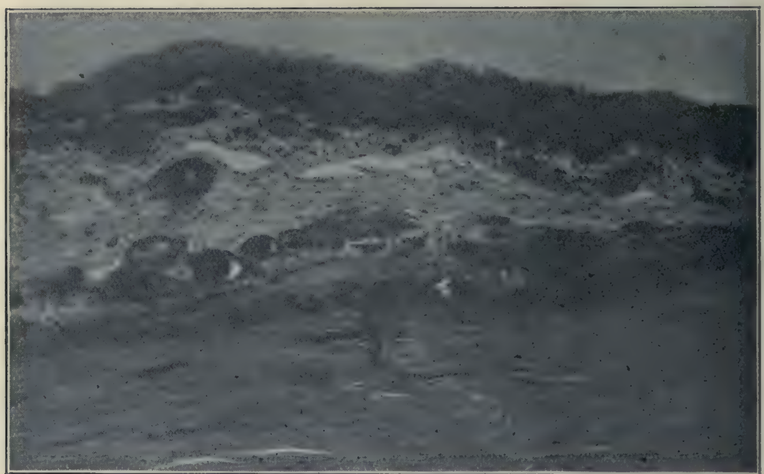

FIG. 2.

Schirmer, and I have examined one case. In my case the affection was strictly a superficial episcleritis and the swelling was situated near the cornea. The conjunctival epithelium is thickened. Underneath it lie the greatly congested conjunctival blood-vessels surrounded by varying masses of round cells. The conjunctival and episcleral tissue is somewhat œdematous and its elements are pressed apart. In it are seen a number of evidently enlarged lymph-vessels, and their number appears greater than in the norm. The episcleral blood-vessels are enormously engorged, so that they form almost a continuous layer, the small interstices of which

are filled with round cells. The round cell infiltration reaches also into the superficial layers of the sclerotic. (Figures 1, 2 and 3.)

What I find in this case agrees perfectly with what Uhthoff and Schirmer have seen, only in their cases the round cell infiltration seems to have reached a little deeper into the scleral tissue. Uhthoff, moreover, in his specimen found evidences of small hæmorrhages which are very likely to happen in a tissue so gorged with blood. The normal ele-

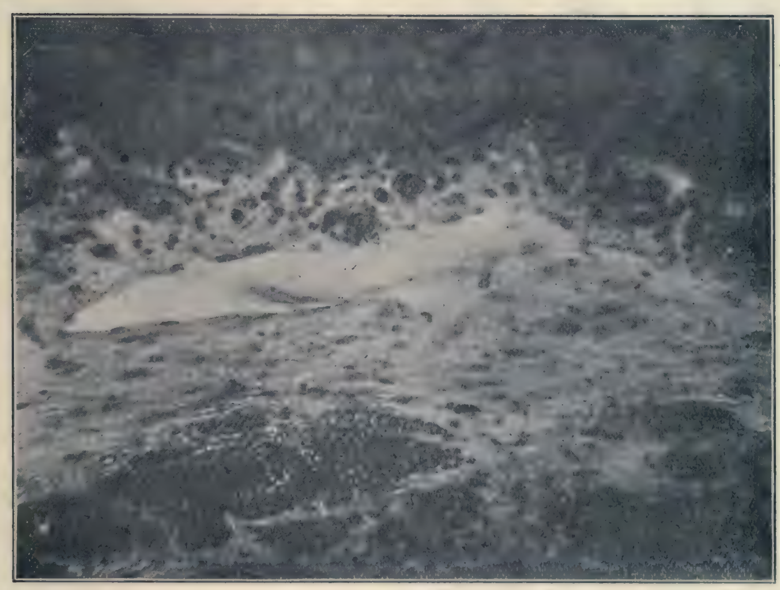

FIG. 3.

ments of the tissues did not seem to be materially altered in any of these cases.

Cases of deeper scleritis at a florid stage have been described by Schirmer, Uhthoff, Holthouse and Collins, Schlodtmann, Friedland, Kostenitsch and Ginsberg. I have seen a number of them also. While in these cases the episcleral tissue is always involved in the process of inflammation, it is especially the scleral tissue which suffers. There is usually a very considerable infiltration of round cells in the superficial layers of the sclerotic fibres which quite frequently assumes the shape of tubercle-like round and oblong nodular

formations. The pressure leads to hyaline degeneration or necrosis of the scleral fibres. Friedland found, also, some giant cells. The pressure of the increasing number of round cells may also lead to necrosis in the round cell accumulations themselves, so that they lose their cellular characteristics and form a more uniform semi-hyaline mass. (Figure 4). The underlying part of the uveal tract is usually also inflamed. Later on, when the inflammatory process has subsided, the sclerotic is thin, there are few cells visible in it, the blood-vessels are obliterated and the corresponding part of the uveal tract is also atrophic and attached to the sclerotic.

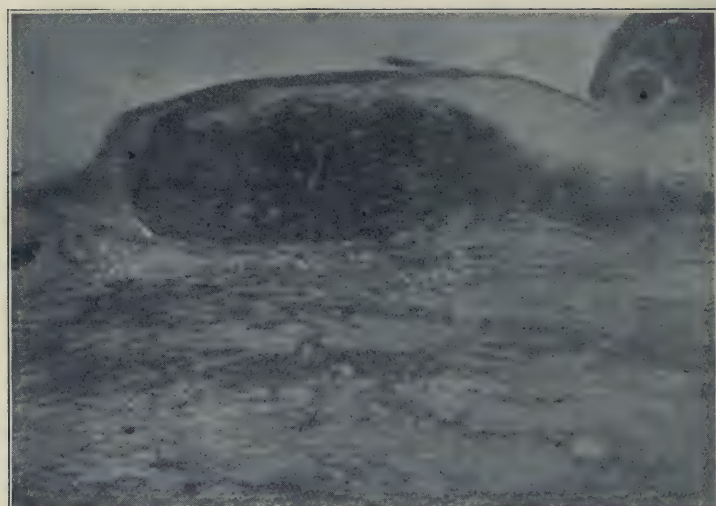

FIG. 4.

When the scleritis is still more virulent, we find also the inner layers of the sclerotic and the corresponding part of the uveal tract infiltrated with round cells, so that the boundary line between the two membranes cannot be distinguished. Between the infiltrated superficial and deep layers of the sclerotic there is usually a middle part which seems but little affected. In other cases the infiltration concerns all the layers of the sclerotic. All episcleral and conjunctival blood-vessels are gorged with blood and the lymph-vessels appear to be much more numerous and larger than in the norm. Necrosis of the scleral fibres and of the infiltrating cells is usually seen in these cases.

The process leads finally to atrophy and stretching of the affected parts (staphyloma), yet it may also, and it does so usually in the parts near the posterior pole of the eyeball, lead to the new formation of connective tissue and thus cause a so-called hypertrophy of the sclerotic, as we are accustomed to find it in phthisical eyeballs.

This in the main is the description which is given by the different authors and also of my own observations. I might add that the deep scleritis, like the superficial, is found as a rule where the larger blood-vessels pierce the sclerotic, and I am of the opinion that this form of scleritis is an affection secondary to an affection of some part of the uveal tract. The most undoubted example of this we see in cases of florid panophthalmitis in which even the orbital tissues surrounding the eyeball may be drawn into the process of inflammation.

Herein also lies the reason that I believe that the superficial episcleritis is a disease *per se* and distinct from the deeper scleritis. I further believe that Schlodtmann is right in assuming that episcleritis is probably a special mycotic disease, the parasite of which, as yet unknown, may some day be found.

Although giant cells have been found in some cases of deeper-seated scleritis, no bacilli of tuberculosis have been demonstrated. Neither could syphilis be assumed to explain the histological findings.

Pathological research, as is seen from the foregoing, has thus far not succeeded in throwing much light on the nature and etiology of the diseases under consideration. Yet, clinically they form a distinct group which is not to be confounded with other affections. It is, therefore, clear that, perhaps, a great many more such cases will have to be studied pathologically, from a histological as well as a bacteriological standpoint, in order to solve their mystery.

Here, maybe, you will permit me to swerve a little from the subject of this paper and put in a plea for the pathologist who, if ever so willing to do the work, cannot get the necessary material for study, unless it is supplied to him by those of his colleagues who do not themselves make use of it for special study. There are still too many interesting and important eye specimens simply cut to pieces, or allowed to rot

and dry up in jars, when in the proper hands they might help to solve one or the other question of importance to science—that is to humanity. No worker in this field can get enough material from his own practice. What a wealth of material might he have to work on if no specimen was thought too trivial to be submitted to his study!

After this *oratio pro domo* let us return to our subject, as we have still to consider the treatment of episcleritis and scleritis.

In correspondence with our lack of knowledge as regards the cause and true character of these affections, we find a perfect wealth of recommendations in the text-books. As most, in fact all, of them consider rheumatism and gout the prime causes of episcleritis, they are unanimous in giving first place in its treatment to anti-rheumatic remedies, especially the salicylates, and of late with preference aspirine. It has also been my experience that these remedies seem to have a beneficial influence in some cases, at least as far as relieving the pain and discomfort are concerned. Yet they will do the same in non-rheumatic affections, as, for instance, in syphilitic iritis. I have tried them faithfully and sometimes, perhaps, only too persistently, in episcleritis, and I have convinced myself time and again that, as far as curing the disease is concerned, they are unreliable. I must say the same of the iodides and mercury internally, except in syphilitics. Subconjunctival injections of solutions of different mercurial salts and of pure salt solution have sometimes a beneficial action, but in other cases they seem to add decidedly to the irritation present and to aggravate the disease. Pilocarpine locally, internally, or subcutaneously does sometimes well, so do heat and cold, but their efficacy seems to give out after a little while, like that of the other remedies previously mentioned, whether we combine with them mydriasis and rest in a dark room, or not. Massage with yellow oxide of mercury, aristol or salicylic acid, in the form of ointments, is decidedly beneficial up to a certain point and then disappointing. I have never practiced the removal of the episcleral tumor with the knife, cautery, or sharp spoon, as has been so highly recommended by some, nor peritomy of the conjunctiva.

One remedy I have always at first tried in the last ten

years, and that is the inspergation of calomel. With it, especially in recent cases, I have had a number of excellent results. In fact, having had a series of cases which in comparison to other methods had yielded very promptly to this remedy, was what prompted me to bring this subject before you. I had even thought that I was the first to use it and to recognize its value in this affection, when, as is so often the case, I found this was a mistake and that Nettleship, also, recommended it. I raise no question of priority. But, as I said, I was almost convinced that I had found a reliable remedy for the disease and was highly elated, when two cases followed in rapid succession in one of which its action was neutral and in the other decidedly bad. In spite of this I feel that I should advise you to give calomel a fair trial. Most recently adrenaline and all the other derivates of the suprarenal gland have been recommended for this as for a good many other eye diseases. I have tried them, also, and found them wanting. Brilliant adjuncts as these remedies are, I have still to see the first case in which they have a lasting therapeutic effect. To be sure, with them you can blanch the affected area, but their therapeutic effect is nil.

If we are at a loss what to do in the treatment of the superficial episcleritis, this is even more so in cases of the deep seated scleritis. In these the complications must have a decided influence on our therapeutic measures and it would lead us too far, would we here consider all the different possibilities. However, I may say that mercurials have now and then a good effect, as we might expect from our experience with these remedies in cases of disease of the uveal tract.

LITERATURE.

Alt, A. Knapp's Archiv f. Aug. & Ohrenhlk., vi, 1877.
Alt, A. Lectures on the human eye. 1880.
Uhthoff, W. Arch. f. Ophth. XXIX, 1883 & XLIX, 1900.
Alexander, Syphilis & Auge. 1889.
Holthouse, E. H. Royal London Ophth. H. Rep. XIII, 1893.
Kostenitsch, Arch. f. Ophth. XXVIII, 1894.
Schirmer, O. Arch. f. Ophth. XLI, 1895.
Schlodtmann, W. Arch. f. Ophth., XLIII, 1897.
Friedland, F. Arch. f. Ophth. XLVIII, 1899.
Sandford, A. Am. Journ. of Ophth. XIX, 1902.
Ginsberg, S. Path. Histologie des Auges. 1903.

MEDICAL SOCIETIES.

PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.*

W. LANG, F.R.C.S., President, in the Chair.

Friday, March 13th, 1903.

ANOPHTHALMOS AND MICROPTHALMOS IN A CHICK.

MESSRS. TREACHER COLLINS and J. HERBERT PARSONS described the microscopic appearance of sections through the orbits of a chick in which the right eye appeared to be congenitally absent and the left eye abnormally small. In the right orbit a ring of hyaline cartilage, like that of the sclerotic, was found enclosing partly-pigmented tissue, similar to that of the choroid. There was no lens, retina, pigment epithelium, or optic nerve; there was thus a complete failure in development of all structures derived from neural epiblast. The essential element of an eye was a nervous mechanism which served to receive visual sensations for transmission to the brain. Where this mechanism was completely absent, the condition might be accurately described as one of anophthalmos, notwithstanding the presence of some of the subsidiary structures developed from mesoblast. As far as the writers had been able to ascertain, there was no case of congenital absence of the eye in which it had been satisfactorily shown by microscopical examination that the mesoblastic structures were entirely absent. On the left side the chick had a microphthalmic eye in which the lens had failed to become separated from the cornea. The capsule of the lens was adherent to the substantia propria of the cornea, Descemet's membrane having failed to develop. The adhesion had obstructed the growth of the iris forwards; above, it had turned back and crept around the posterior surface of the lens; below, its growth had become arrested.

THE X-RAYS IN TRACHOMA.

MR. MAYOU read a paper on the treatment of trachoma by the x-rays. The idea first occurred to him when treating

*British Medical Journal.

rodent ulcer and lupus of the eyelid, on finding that no serious damage was done to the globe. The first case cured in this way was shown by him last June; since then several others had been successfully treated. The histological changes in living tissues exposed to the action of the x-rays were then described, the most important change being a superficial irritation capable of being increased and accelerated by the simultaneous application of other irritants, such as copper sulphate. Most of the resulting leucocytosis was found around the trachoma nodules and the cells of rodent ulcer after x-ray treatment of these diseases, the reason for this being that they similarly acted as irritants. It was next pointed out that with care the amount of reaction produced could be regulated and that the varying degrees of reaction might be compared with the first three degrees of burns described by Dupuytren. Cases of prolonged exposure of the globe to the x-rays were then instanced, where the only bad effects produced, and those only temporarily, were falling out of the eyelashes and conjunctivitis; this latter trouble was also found amongst workers in the x-rays, and in them it could be prevented by the use of lead glass spectacles. Mr. Mayou found, with Fuchs and Kreidl (1896), that there was no bleaching of the visual purple by the x-rays; his experiments were carried out on rabbits and frogs. The results of treatment by the x-rays were then compared with those produced by copper sulphate, jequirity, and other irritants, and it was pointed out that there was less destruction of tissue and subsequent cicatrization, as well as less pain, with the former method. The technique of the treatment was then described. The eyelids were everted (the operator's hands being protected by bismuth ointment and cotton gloves); the cornea was only exposed in severe cases where pannus were present. Owing to the infiltration set up difficulty was found in deciding when treatment should cease. Out of nine cases, five remained well, one cleared up but recurred two months later, two others improved and still under treatment, and in one case of corneal opacities following trachoma the vision had improved from P. of L. to fingers at 3 feet. The advantages of this treatment were: (1) There was less resultant deformity of the lid; (2) it was painless; (3) pannus cleared more

thoroughly. The disadvantages were: (1) All patients did not react well to x-rays; (2) it was sometimes difficult to tell when treatment should cease.

Lantern slides of the histological changes produced by the x-rays were shown, and also two patients who had been cured by this treatment.

Remarks were made by the President and by Messrs. Cargill and Stephenson, the latter having seen the best results from the use of high frequency currents.

Injuries to the Eye of the Child During Labor.

Drs. Ernest Thomson and Leslie Buchanan communicated some of the clinical and pathological observations which they had made upon this subject. After indicating the scope of the work done in this connection, Dr. Ernest Thomson gave a summary of the lesions in the 12 cases observed. These comprised expulsion of the eyeball, proptosis, injuries to the cornea, hæmorrhages into various parts of the eye, and retroversion of the lens and vitreous body without rupture of the globe. Dr. Leslie Buchanan described in detail three cases of lesion of the cornea, namely: (1) Rupture of the posterior elastic lamina with involvement of corneal tissue (healing); (2) rupture of the posterior elastic lamina and corneal tissue (unhealed); (3) rupture of the posterior elastic lamina with abrasion. The points of similarity and difference were briefly explained. The identity of those cases of rupture of the posterior elastic lamina and corneal tissue with the cases already described as traumatic keratitis with linear opacity* from a clinical standpoint was pointed out, and the etiology of other corneal opacities seen at birth were discussed. Remark was made upon the very unusual injury, retroversion of the lens and vitreous body, and the nature and origin of the case somewhat fully explained. In conclusion, the subject of traumatic exophthalmos was dealt with, and allusion made to the connection between them and the localized indentation of the cranial bones due to pressure against the sacral promontory. The subject was illustrated by macroscopic and microscopic specimens and diagrams.

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*Trans. Ophth. Soc., Vol. XXII.

Dislocation of Eyeball.

Mr. Lawford read notes of a case of complete dislocation of the eyeball forwards, occurring in a child, aged 7, as the result of a fall against an iron fender. Reduction was easily effected under chloroform, and recovery ensued, with no defect of sight and no limitations of movements of the eyeball. Slight proptosis was noticeable for one month after the accident, but no restriction of ocular movements could be detected even three days after the reduction of the dislocation.

Card Specimens.

The following were shown: Dr. Leslie Buchanan: (1) Separation of the Ciliary Body; (2) Congenital Maldevelopment of the Cornea and Sclerotic. Mr. Stephen Mayou: Two Drawings of the Normal Fundi, Illustrated by the Mercury Vapor Lamp. Mr. Arnold Lawson: (1) A Case of Paralysis of the Ocular Fibres of the Cervical Sympathetic with Aortic Disease; (2) a Case of Chronic Irido-Cyclitis (Probably Sympathetic) Following a Rupture of the Globe Twenty-one Years Previously. Drs. W. E. Thomson and Leslie Buchanan: Preparations Illustrating the Effects of Injuries to the Eye of the Child During Labor. Mr. W. H. H. Jessop: Tumor in the Macular Region. Messrs. Sinclair and Parsons: Endothelioma of the Cornea. Mr. Doyne: (1) Melanotic Carcinoma of the Upper Lid with Pigmentation in the Lower Lid; (2) Intraocular Hæmorrhage in a Young Man. Mr. Goldsmith: Hole in the Macula. Mr. N. Bishop Harman: Connective Tissue Veiling the Optic Disc.

PAMPHLETS RECEIVED.

"The Principles Controlling the Non-Operative Interference in Heterophoria," by S. C. Ayres, M.D.

"Metastatic Carcinoma of the Choroid." With report of a case, and review of the literature, by E. L Oatman, M.D.

"The Use of Gelato-Glycerine Bougies in the Treatment of Acute Earache in Young Children," by G. L. Richards. M.D.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Meeting, March 17th, 1903.

DR. S. D. RISLEY, Chairman, Presiding.

SECTION ON OPHTHALMOLOGY.

Subject for discussion:

THE TREATMENT OF MYOPIA.

DR. GEO. C. HARLAN, in introducing the subject for discussion, gave a short history of the treatment of myopia. He said that formerly there was an almost universal dread among ophthalmic surgeons, of full constant correction of myopia, particularly of the higher grades, but that recently a change of opinion and of practice had become quite general. Quotations from standard European authorities of comparatively recent date showed that undercorrection, especially for near work, was the universal teaching. In America, on the contrary, de Schweinitz, in his text-book, and Duane, in his translation of Fuchs, advocate constant full correction as a rule.

In a discussion of the subject, at the meeting of the American Ophthalmological Society in 1892, a number of the members stated that they approved and practiced this method. More recently it has been gaining in favor in Europe, and at the last meeting of the Heidelberg Society it met with general acceptance, in fact, was opposed by none. The theory that the nearer the eyes can be approximated to the normal condition of emmetropia, the more comfortably and safer they can work, seems to be rapidly gaining ground.

The theory of undercorrection seems to be based principally upon the idea that accommodation rather than excessive convergence is the chief factor in progressive myopia, but it is now being more and more admitted that excessive convergence without accommodation is an important factor. The pressure of the external muscles tends to elongate the ball, and the strain of muscular asthenopia keeps up a constant irritation and congestion. The high myope, while encroaching upon his reserve of convergence, suppresses his accommodation, thus disturbing the close association of these two functions. Graefe, more than 30 years ago, strongly urged

the performance of tenotomy of the external rectus as a curative measure in cases of progressive myopia associated with insufficiency of convergence. Usually the convergence will fall into line when the accommodation is put to work by the proper concave glass; if it does not, prisms or tenotomy are in order.

Of course, the full constant correction of high myopia is advocated only as a general rule to which there may be many exceptions, and each case should be studied and decided on its own merits. The diminution of the retinal image by concave glasses, and the consequent tendency to bring objects closer to secure a wider visual angle, should be borne in mind, and the acuteness of vision and the range of accommodation should receive careful consideration. If full correction does not give fair vision, particularly if there are decided choroidal changes, it is sometimes well to throw off two or three diopters from the glass for constant use, and to give them to the patient in hook-fronts or lorgnettes, or even in a single glass hung about the neck, to be added occasionally for distant vision; and if the near point is farther than 6 or 8 inches, bifocal glasses will often offer the best solution of the problem.

Dr. H. F. Hansell classified myopia under three heads: (1) Congenital; (2) acquired, and (3) hereditary. In the first, the myopia is only the state of the refraction, and is a symptom, entirely secondary to the congenital disease of the sclera and dependent choroidal atrophy. It is in no sense the disease itself. It is found in childhood, and in individuals who have no education and whose progenitors have not been subjected to the strain of literary pursuits, for example, in the peasants who have emigrated to America. Concave lenses, several diopters weaker than the full correction, will materially improve vision, and possibly postpone for some years further degenerative processes.

Acquired myopia includes those cases that were born hyperopic, but through educational requirements the refraction changes to emmetropia and finally into myopia. The most influential factor in inducing this increase in refraction is astigmatism. The tendency to ectasia of the sclera is strengthened in the third class by inherited weakness of the

sclera, which, in combination with the other causes, leads to the rapid development of the myopia.

In the optical treatment, the speaker's practice is to modify the strength of the lens in accordance with the degree, with the age, and with the relative strengths of adduction and abduction. For the distance, he prescribes as near a full correction as can be worn with comfort, believing that exophoria, so frequent a complication, is held in abeyance by sharp acuity of vision of each eye rather than by treatment directed to the muscles. For the near, he advocates less than the full correction, always in high degrees at any age, and in moderate degrees in adults and sometimes in children, for the reason that the myopic eye should be considered as a "sick" eye, and hence accommodation should not be forced. In the correction of myopia higher than 8 D. or 10 D., he uses no cycloplegic. In all degrees the exact amount and axis of astigmatism should be learned and corrected.

Dr. G. E. de Schweinitz, after referring to the treatment of young persons whose eyes were passing gradually from hyperopic into myopic refraction, and the great importance that the recognition of such alterations in refraction, after repeated examinations, should have in the prevention of myopia, particularly in the recognition of the smallest degrees of astigmatism, said that in his remarks on the treatment of fully developed myopia he referred only to myopes with reasonably healthy eye-grounds, whose visual acuity could be raised by concave glasses to the normal standard, and did not take into consideration at that time forms of so-called pernicious myopia in which choroidal and other changes in the eye were evident, and in which, as Dr. Hansell had well said, the myopia was a symptom of disease.

Dr. de Schweinitz believed that young persons under 25, with good vision and a moderate degree of myopia (under 6 D.), should wear the full correction constantly if accommodation is ample and no signs of fatigue are evident. Indeed, he was prepared to say that the same rule was applicable to patients until they had reached those years when the accommodation must necessarily receive help, or when examination showed that the amplitude of accommodation was not equal to the necessities of the patient's life. He agreed with Dr.

Jackson that full correction is the object to be attained for young persons with normal visual acuity and binocular near vision, no matter how high their myopia, provided the lens selected should not be an overcorrection when brought close to the eye. He fully understood and agreed that there were many exceptions to these rules, and, as Dr. Harlan has said, each case should be studied and decided on its own merits, but, other things being equal, he considered it a positive misfortune that when young people first came for the correction of their myopia they should be given the so-called undercorrections, because once undercorrection having been given, it was difficult to alter it to a full correction. He believed with Priestley Smith that every youthful myopia should be suspected of a tendency to increase, and therefore should be reexamined at regular intervals, which intervals should not exceed in length twelve months, and that at each such examination full and prolonged mydriasis should be employed. He was satisfied that this method of treatment tended to check myopia, and although he had in the earlier portion of his career, according to teaching then rather prevalent, given undercorrections, he had not done so, other things being equal, for the last ten or fifteen years, and had been satisfied that his results justified the course pursued. Dr. de Schweinitz was very sure that the fitting of glasses was not the only therapeutic measure suited to the treatment of myopia, but that the tendency to congestion of the choroid coat should be combated by the administration of the various alteratives from time to time, and that active mydriasis with some drug, than which there was no better than atropin, for prolonged periods at a time when the recorrections before mentioned were made, had a distinct therapeutic value. He was satisfied that those who had expressed much dissatisfaction with what are known as full corrections often failed because they had not employed a sufficiently active mydriatic. Dr. de Schweinitz enumerated the cases of myopia which did not permit a full correction, independently of those exhibiting pathologic alterations in the fundus, and referred especially to the fact that he based his practice of giving full corrections in myopia entirely on the results obtained by the examination of the visual acuity, the range of accommoda-

tion, the character of the myopia and the condition of the external ocular muscles. He was most particular to measure and correct the smallest degrees of astigmatism, and was satisfied that among his most grateful patients he numbered those to whom he had given full correcting glasses for the neutralization of their myopia and myopic astigmatism, or whom he had taught to use full correcting glasses when they had previously struggled against the constant disadvantage of an undercorrection when viewing distant objects.

Dr. George M. Gould said: As we all know, every case is an individual study, and hardly any rule can be formulated as to the treatment of myopia which has not as many exceptions as instances in proof. The fact which renders almost all previous opinions, statistics, and data valueless is the omission of an accurate correction of the astigmatism. Our foreign colleagues have not cared to do this and have not chosen the proper means to do it. Without mydriasis and subjective testing the astigmatism in myopia cannot be found, and this vitiates all conclusions. The same may be said of anisometropia, equally neglected, and equally powerful to affect results. Then, I have never been able to determine what is meant by "full correction." It is easy to bring patients with myopia to normal acuteness of vision and still the ametropia may be incorrectly diagnosed, may be undercorrected or overcorrected. It all depends upon the individual oculist, his methods, keenness of observation, conscientiousness, etc. As for myself, I never fully correct myopia, for constant use, and I believe such advice is wrong. My case records show that a large portion of my myopic patients have passed through the care of other oculists and are relieved of their reflex and local troubles by a modified glass or by undercorrection. One case may illustrate the evils of full or rather approximately full correction. A patient was given nearly full correction of a moderately high myopia, to be used only in riding or at the theater, etc. Every time he wears these glasses he at once gets a violent cold, with hoarseness and coryza. In an hour after taking the glasses off and returns to his lower correction, given for house and business purposes, his "cold" disappears. This has happened hundreds of times. If these latter glasses become

bent or maladjusted, he also gets his "cold," and goes to the optician to be cured at once.

Dr. T. H. Fenton believed in describing the full correcting lens for distance, but it was his custom to order a weaker glass for near work. The amount of reduction in the strength of the reading glass varied with the degree of defect, the age of the patient and the power of adduction. In high degrees of error he frequently gave one-half the full correcting lens for near use.

Dr. S. D. Risley, in closing the discussion, said that on careful analysis and in actual practice it could probably be shown that there was less actual divergence of opinions than appeared in any cursory view of the remarks made by the various speakers, but, nevertheless, practice in the treatment of myopia would be affected by the views entertained regarding the etiology and essential nature of the condition. Personally, he considered the subject one of the most serious confronting the ophthalmic surgeon. The classification made by Dr. Hansell was the conventional one, but in his own experience congenital myopia had been extremely rare, and, so far as he could recall, had occurred only among imbecile children who had other marked anatomical anomalies in the form of the skull. Indeed, he had seen very few cases of myopia before 6 or 7 years of age.

Regarding heredity, he was not willing to accept it as a potent factor in the etiology of the affection, except in so far as certain hereditary anatomical peculiarities in the form of the skull, which led to abnormalities in the size and shape of the bony orbit, might be regarded as an hereditary tendency. From an analysis of a large number of myopic patients treated in private practice, he found that myopic children quite as frequently had parents with hypermetropic astigmatism, and that the children of myopic parents were far more frequently hypermetropic than myopic. The only hereditary bias, beyond question, was the unvarying fact of the heredity of the hypermetropic eye with astigmatism and the absolute abnormalities of binocular balance.

This was due to the distortions of the family skull and the resulting abnormal shape of the orbit, which affected the form of the eyeball, giving rise to astigmatism, anisometropia, and

abnormalities in the origin, line of direction, and attachment of the muscles to the globe. The eye-strain caused by the effort to secure accurate binocular vision in the presence of these defective conditions set up congestive, irritative, and inflammatory states of the intraocular membranes which were, he believed, the important etiologic factors in the myopic eye. The intraocular congestion probably gave rise to a degree of tension of the globe which the readily yielding tissues —*i. e.*, the sclera—of childhood were not prepared to resist, and hence the distention or stretching of the globe.

Regarding the full optical corrections of myopia, the idea was by no means a new one, since he had, from his earliest experience, given full correcting glasses for distance, believing that the scientific procedure was to first determine the static refraction of the eye, and then reduce the optical conditions to emmetropia, since he believed the emmetropic to be the model eye. He was confirmed in this view by the laboratory studies of Donders, whose book was his first text-book. It would be recalled by those familiar with the subject that Donders had shown that myopes who had worn correcting glasses for a long time manifested, as shown by his charts, a relative range and region of accommodation and convergence which closely approximated that of emmetropia, the chart differing very widely from that of the uncorrected myope.

This to him afforded a strong argument in favor of full corrections, but, as Dr. Gould had very correctly claimed, it was impossible to establish a rule which would be applicable to all cases. There were many eyes too tender to bear the strain of accommodation and convergence at the near-point.

It was always to be borne in mind, as Dr. Hansell had so well said, following Donders in this, that the myopic eye is a sick eye. It would be found that the conclusions regarding full corrections, based upon the experience of any individual surgeon, bear very close relation to his methods and the care with which he sought to correct any existing astigmatism or muscular unbalance. Undercorrections were unquestionably safer for the patient with bad eyes, where manifest corrections were made or in the absence of a careful analysis of all existing conditions. Personally he believed that in eyes with progressive myopia, no trustworthy measure of the static re-

fraction of the eye could be made until under prolonged treatment with a strong and enduring mydriatic and complete rest the pathologic conditions of the fundus oculi had subsided. He had many times seen, under the most careful daily study, the myopia diminish day by day, changes taking place in both the degree of astigmatism and the direction of the corneal meridians, as the eye settled back toward a state of rest and health. Any glass, therefore, selected by subjective or even objective methods of examination, and ordered at the first trial, would not have represented the true static error, and would not have been worn either safely or comfortably. He contended, therefore, that the mydriatic in these sick eyes should be used not only as a cycloplegic but as a therapeutic measure, and that only by this means could the actual static refraction of the eyes be determined; that unless so determined in cases of progressive myopia undercorrecting glasses were safer.

Another point which could not be safely overlooked was that we could not expect these tender eyeballs, with blood vessels once distended and a sclerotic that had once given way under the strain of work, to resume continuous near work safely, except under the most favorable conditions. It was at this point, and at this only, he must differ with the views expressed by Dr. de Schweinitz. Except in the lower degrees he thought that work at the near-point in progressive myopia was done more safely with a glass giving an artificial far-point, just beyond the working distance, thus removing all strain on the accommodation and at the same time relieve the strain upon the convergence by prisms base in or a careful decentering of the glasses. This could often be done by a pair of bifocal glasses centered for infinity.

In concluding, he said that it was better to give such a reading glass for constant wear, with which no effort for distinct vision would be made, than to give approximate corrections, since a blurred image was always distressing because of the unconscious effort of the accommodation to focus it. He illustrated this point by calling attention to the restfulness of the fine adjustment of the microscope, and by the distressing experience of spending an evening in looking at badly focussed pictures thrown on a screen which were sure to send the observer home with tired eyes and a headache.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
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THE PRESCRIBING OF GLASSES.

Alexander Duane gives the following rules for the prescribing of glasses:

1. Correct all the astigmatism the patient has, unless it is over 6 D., in which case he is sometimes more comfortable and gets quite as good vision with the astigmatism slightly under-corrected. Do not hesitate to prescribe cylinders of more than 6 D. when they give appreciably better sight than glasses of less strength. Astigmatism of only 0.25 or 0.50 D. do not prescribe for, unless the symptoms (asthenopia, blurring of sight, etc.), particularly call for the correction, or unless the patient has to use his eyes for very close and continuous near work, or finally unless the patient is going to use glasses anyhow (*e. g.*, for presbyopia), in which case add the cylindrical correction however small.

2. Correct the full amount of myopia, and whenever possible have the patient use the same correction for distance and near. Of course this cannot be done if he is much beyond the age of forty years, and even below that age we may have to give the myope different glasses for reading and distance, particularly if he has not used concave lenses before for near work; but in myopes under forty years of age Duane finds he usually succeeds in getting his patients to use full correcting lenses for all purposes, if they are at all faithful in following his instructions. In children it is particularly important to give the full correction whether of high or low degree, and to insist on constant use, as this course tends more than anything else to retard the further development of the myopia. It is also of great importance to correct fully the myopia and to insist on the patient wearing the lenses for all purposes when he has a convergence insufficiency, the fully correcting lenses for near and far stimulating the accomodative power and preventing the development of a divergent

squint. Myopia of very high degree in some instances may have to be under-corrected on account of the annoyance of light dispersion in very strong concave lenses, but we may generally prescribe concave lenses up to 18 D., and in a few cases with advantage even stronger ones.

3. Correct all the absolute and all the manifest hyperopia. The latent hyperopia may be under-corrected, according to:

a. The age of the patient. The older he is the less in general can be left uncorrected. No absolute rule can be laid down, but it may be stated that in children under twelve years of age from 1 to 2 D. of latent hyperopia may often be disregarded, and from twelve to twenty-five years of age 0.75 to 1.25 D., while twenty-five to forty years should have only 0.50 to 0.75 D. disregarded.

b. The conditions under which he works. If he has to use his eyes excessively, especially at some trying kind of work, and particularly if by artificial light, a stronger glass is required than if he were using his eyes mainly for distance and by daylight.

c. His symptoms. A patient with asthenopia, headache, and other evidences of eyestrain will require fuller correction of his latent hyperopia than one who has no such symtoms. So also one suffering from accommodative weakness, due either to neurasthenia or to the effects of a recent illness, will require the correction of nearly or quite all of his hyperopia, even if of low degree.

d. The muscular conditions. A patient with esophoria, and still more one with an actual convergent squint, due to convergence excess, should wear constantly the full correction of his hyperopia, or within 0.25 D. of it. Per contra. a patient with marked exophoria, and particularly an exophoria due to convergence-insufficiency, often does better if his hyperopia is moderately under-corrected.

4. In anisometropia, whenever the vision can be brought up to any thing like the normal, try either to give the full correction in both eyes, or else reduce the full correction by an equal amount in both eyes, telling the patient to wear the glasses steadily and to persevere even if he has trouble in wearing them the first week or possibly the first two weeks. The indications for thus correcting anisometropia is particu-

larly important when there is a tendency to deviation of the eyes,—either squint or insufficiency.

THE THERAPEUTIC VALUE OF LARGE DOSES OF THE SALICYLATES IN UVEITIS.

H. McJ. Morton (*Ophthalmic Record*, January), for the last eleven years has used large doses of the salicylates in all cases of uveitis with very satisfactory results. He finds that 30 to 60 gr. doses produce decided results where 10 to 20 gr. doses accomplish but very little. In severe cases he gives 40 grs. every two or three hours until relief is obtained. He advises giving it in cold water, on an empty stomach.

A CASE OF IDIOSYNCRASY TO HOMATROPINE AND ATROPINE.

William L. Phillips (*Ophthalmic Record*, January), reports a case where homatropine and atropine produced myosis instead of the usual effects.

THE TREATMENT OF AN INFECTED CORNEAL WOUND WITH ACETOZONE.

J. F. Klinedinst (*Journal of Eye, Ear, and Throat Diseases*, November-December, 1902), thinks that we have in this agent a germicide which is safe and more powerful than any other. The author thinks one grain to two fluid ounces of water, quite strong enough for prompt and satisfactory results, but says it can be used much stronger. The stronger solutions produce considerable temporary pain.

RETINAL HÆMORRHAGES--AN AID TO THE EARLY RECOGNITION OF GENERAL ARTERIAL DEGENERATION.

Henry C. Haden (*Phila. Medical Journal*, Feb. 21,), refers to the importance of detecting degeneration of the arteries in the early stages, reports two cases of retinal hæmorrhage without inflammatory symptoms, and draws the following conclusions:

1. Retinal hæmorrhages, associated with high arterial tension and accompanied by transitory albuminuria, are significant of beginning widespread arterial degeneration.

2. That in those cases of so-called physiological or transitory albuminuria, occurring in active, healthy young business

men or students, in those who are working under forced pressure, an ophthalmoscopic examination should be made.

3. When retinal hæmorrhages occur without albuminuria, the patient should be kept under observation, the urine to be examined from time to time and the quantity passed noted.

4. In case we find these conditions, it is our duty to warn the patient of his condition and, as Osler says, "so gain his intelligent co-operation," and preserve his life and usefulness.

BOTTLE FINISHER'S CATARACT.

William Robinson (*British Medical Journal*, Jan. 24, 1902,), refers to the frequency of cataract in bottle finishers, who are exposed to the bright light and intense heat of a furnace, during their working hours. Six cases are reported. The disease begins early in life, usually as a posterior polar cortical cataract, and progresses slowly. It can be prevented by wearing dark blue spectacles.

THE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY. —At its recent meeting held at Indianapolis, April 9th to 11th, the Western Ophthalmologic and Oto-Laryngologic Association adopted a new and broader constitution and changed its somewhat unwieldy name to that of the "Academy of Ophthalmology and Oto-Laryngology." The meeting was a very successful and instructive one, and the entertainments prepared by the local profession were highly enjoyable. The Academy elected the following officers: President, Dr. Edward Jackson, Denver, Col.; 1st vice-president, Dr. D. S. Reynolds, Louisville, Ky.; 2d vice-president, J. J. Kyle, Indianapolis, Ind.; 3d vice-president, Dr. J. W. Murphy, Cincinnati, O.; secretary, Dr. D. T. Vail, Cincinnati, O.; treasurer, Dr. J. O. Stein, Chicago, Ill.; Council, Dr. Adolf Alt, St. Louis, Mo.; Dr. W. Ballenger, Chicago, Ill.; Dr. Casey A. Wood, Chicago, Ill.; C. R. Holmes, Cincinnati, O.

BOOK REVIEWS.

Diseases of the Skin.—Their Description, Pathology, Diagnosis and Treatment, Etc. By H. Radcliffe Crocker, M. D. Third edition revised and enlarged. With 4 plates and 112 illustrations. Philadelphia: P. Blakiston's Son & Co. 1903. Price $5,00.

This is one of the best and most complete of textbooks on skin diseases in the English language. As can be expected, it is thoroughly up to date, and pays attention to all recent researches and remedies. The illustrations are good. We might wish there were more of them. The exhaustive chapters on hyphomcyetic and animal parasites of the skin are especially interesting. Alt.

PAMPHLETS RECEIVED.

"The Retinitis Albuminurica of Pregnancy," by S. C. Ayres, M.D.

"A Convenient Case for Butterflies and Moths," by J. R. Slonaker.

"A Case of Congenital Fistula of the Internal Nose," by N. H. Pierce, M.D.

"The Nature and Histo-Pathology of the Epipharyngeal Tonsil," by N. H. Pierce, M.D.

"Is the Adenoid Operation a Justifiable Surgical Procedure?" by G. L. Richards, M.D.

"The Treatment of Paralytic Strabismus; a New Operative Procedure," by J. H. Howard, M.D.

"On the Orbito-Ocular Complications of Suppurative Ethmoidal Sinusitis," by Calderaro, M.D.

"The Treatment of Peritonsillar Abscess with Exhibition of New Instruments," by N. H. Pierce, M.D.

"Treatment of Certain Purulent Conditions of the Antrum of Highmore Through the Natural Openings," by N. H. Pierce, M.D.

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ORIGINAL ARTICLES.

AN EXPOSITION OF THE PRINCIPLES OF REFRACTION IN THE HUMAN EYE, BASED ON THE LAWS OF CONJUGATE FOCI.

With 17 Original Illustrations.

By SWAN M. BURNETT, M. D., PH. D.,
Professor of Ophthalmology and Otology in the Medical School of the University of Georgetown.

WASHINGTON, D. C.

IT is a regretable fact that but few undergraduates in our medical schools come to their studies in ophthalmology with such sufficient ground-work in physics as shall allow the professor to assume that their knowlege will enable them to comprehend readily even the simple laws involved in the study of the eye as a collecting refractive system for the formation of images upon the retina. Even those who have gone through the ordinary university or college training have, for the most part, to be taught what optics is necessary from the beginning. It is hoped, and indeed expected, that this will be remedied in the near future; but under any circumstances it will be necessary for the instructor to go over some of this ground in the application of general optical laws to the special conditions found in the eye, in order to make his teaching consecutive and thorough.

Since all the phenomena pertaining to the position and size of the image on the retina and its relation to the object rest upon, and are only to be explained by, the laws of conjugate foci, it would seem that if we could first make our students

thoroughly familiar with these simple laws, by diagrams and models, it would much facilitate their understanding of all the practical problems which arise in the study of the eye as an optical instrument. This, I am fully aware, may be considered as going back to very elementary optics, and repeating what has been said over and over again in our text books, but we must not forget that what has become a very familiar way of looking at the subject to us is still a very unfamiliar way to the average student, who has so many other things to think about; and while it is not possible to make a royal road to knowledge, it is still possible to make the path comparatively smooth and easy to the comprehension of fundamental principles. The conjugate focus is, of course, mentioned often in our treatises and text books, but always in a subsidiary way and incidentally, and not as the bed rock on which the whole fabric of refraction rests. It has occurred to me that such a presentation as is here given might be acceptable to teachers who feel the need of some simple method of explaining the fundamental elements of refraction in all its phases, and it is offered with the hope that it may at least render some slight assistance in their labors. An application of these principles to the details of individual conditions cannot, of course, be attempted in this short essay.

The *laws of conjugate foci*, so far as they pertain to the relative positions of the image and object, are:

1. The rays of light follow the same path going and coming, thus making it possible for the object and image to replace each other.

2. The two foci, representing the object and the image, always move in the same direction. If one moves to the right the other moves to the right also, and *vice versa*.

3. When the object (or image) is situated outside of the principal focus (for parallel rays), the image (or object) is found on the opposite side of the refracting system, and is positive, real and inverted.

4. When the object (or image) is situated within the principal focus (for parallel rays), the image (or object) is found on the same side of the refracting system and is virtual and erect; that is, the rays proceed as if coming from a real object situated at that point.

The operation of these laws is shown diagramatically in Figs. I. and II. (*), where we will follow the object emitting the rays, beginning at infinity on the left and going to infinity on the right.

The object in Fig. I. being at infinity on the left and sending out parallel rays *a a*, has its conjugate focus at the posterior principal focus a^1, on the opposite side of the refracting system O. Infinity and the principal focus are therefore conjugate foci, and both are positive and real.

When the object is advanced to the right to a finite dis-

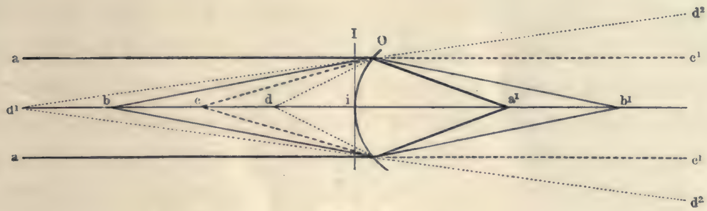

Fig. I.

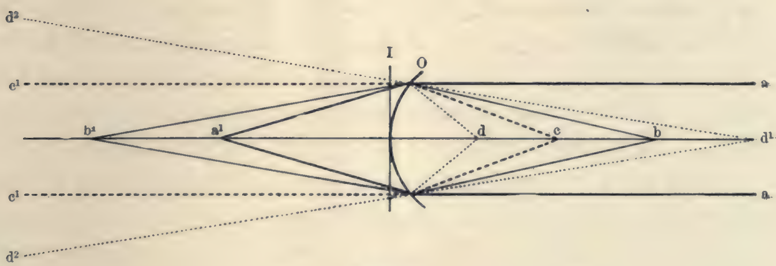

Fig. II.

tance *b*, the conjugate focus, as represented by the image, recedes in the same direction to b^1, and being on the opposite side of the refracting system is still positive and real.

When the object is still further advanced till it reaches the anterior principal focal point *c*, the conjugate focus recedes to infinity on the right as represented by the parallel rays c^1 c^1; the image becomes infinitely large, but being on the opposite side of the refracting surface O is inverted, real and positive.

When the object is advanced to *d*, falling inside the an-

*. For valued assistance in the construction of the diagrams which accompany this paper I am indebted to the well-known scientific and technical skill of Mr. C. F. Prentice, of New York.

terior principal focus c (for parallel rays), the conjugate focus with its image passes beyond infinity, and the rays become divergent, $d^2\, d^2$, as if they come from a real object d^1, situated on the same side of the refracting medium as the object d. The image d^1 is therefore erect, virtual and negative.

As the object d is still further advanced to the right towards the refracting surface O, the conjugate focus d^1 also advances in the same direction, but at a more rapid rate, until the image finally overtakes the object, and both are merged into one at i in I, which is the principal plane of the system. The object still proceeding in the same direction passes to the *right* of the refracting surface O and finds itself, say at d, Fig. II., and within the principal posterior focus c, for parallel rays $c^1\, c^1$, coming from the left. The conjugate focus has also moved to the right, and according to rule 4 is to be found on the same side of the refracting surface, at d^1; it is negative, and the image is virtual, the rays, $d^2\, d^2$, proceding with a divergence as if they came from a real object situated at d^1. The object still receding to the right from the refracting system, the conjugate focus likewise recedes in the same direction, but at a more rapid pace, until the object arrives at c, the posterior principal focus (for parallel rays $c^1\, c^1$), when the conjugate focus will again find itself at infinity on the left, following the parallel rays $c^1\, c^1$ and becomes real and positive. Proceeding with the object then to b, the conjugate focus advances from infinity on the left to the finite distance b^1, and the image is real. A further advancement of the object along the axis to the right is accompanied with a corresponding advance of the conjugate focus and its image until the object reaches infinity (parallel rays $a\, a$), when the conjugate focus is found at a^1, the anterior principal focus of the system.

Comparing these two diagrams, it will be seen that one is the reverse of the other, and that the object could, with the same results, have been started from the right and moved towards the left, demonstrating rule I. of the laws of conjugate foci, that the image and the object can replace each other.

In studying the phenomena of the dioptric apparatus of the eye, we find that the laws of conjugate foci admirably lend themselves to a satisfactory elucidation of the problems which it is necessary for us to solve in practice.

In making an application of these laws, we shall, for the sake of uniformity and simplicity, consider *that one conjugate focus is permanently fixed on the retina; for it is there that the distinct image must always be formed.* The other conjugate focus, which is the varying one, is at the place where the object must be situated in order that this retinal image be distinct. This place has been called the "far point."

The far point and the retina are, therefore, always at conjugate foci.

Whenever the relative position of the retina and the principal focus of the refractive system changes, either by an increase or decrease in the refractive power of the eye, or an alteration in the distance between the retina and the refractive system, in other words, whenever the conjugate focus, represented by the retina, alters its position relative to the posterior principal focus for parallel rays, so also must the other conjugate focus change its position relative to the refractive system, and always in keeping with the laws of conjugate foci, as above explained.

It has been agreed, by convention, to adopt one single position of the retina in respect to the refracting system of the eye as a standard by which every other position shall be compared. This accepted place is when the retina lies at the focus of parallel rays, the posterior principal focus of its refracting system. *In this standard eye, then, the retina and infinity (from which parallel rays proceed) are at conjugate foci, and the optical condition is called Emmetropia (E).*

As compared with this, the only other possible positions of the retina are two—1, that in which the retina lies outside the principal focus for parallel rays, which is called *Myopia* (*M*), and, 2, that in which it lies in front of the principal focus, called, *Hypermetropia* (*H*).

Every eye in all its states of refraction, static or dynamic, must fall in one of these three categories. It must be borne in mind, in these studies of the static refraction, that the absolute refracting power of the eye is not, as might readily be supposed, the matter at issue at all. We have solely to do with the retina and its conjugate focus. It is a fact which has been demonstrated innumerable times that the actual refracting power in myopic conditions may be lower than in emmetropia, and in hypermetropia it may be higher.

Let us now apply the laws of conjugate foci as above stated to an explanation of the phenomena of the refraction of the eye.

In Fig. III. is shown the position of the retina in relation

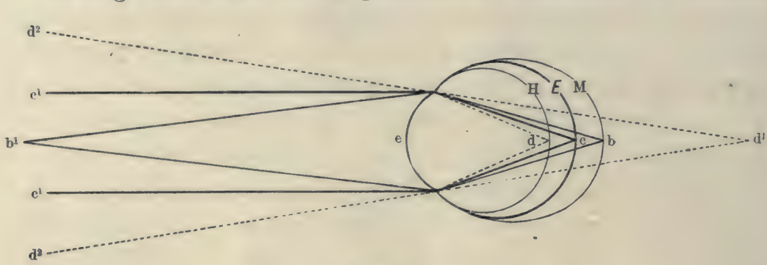

Fig. III.

to the refracting system, in each of the categories of H, E and M, as they are commonly represented, in which the retina c lies at the posterior principal focus for parallel rays (E), while b gives the position of the retina, behind the posterior principal focus, (M), and d its position in front of it, (H).

As, however, according to our manner of considering the subject, the retina is regarded as occupying a fixed position, we can very properly assume that the differences in distance between it and the refracting system of the different categories is attained by a variation in the position of the refracting system itself, as shown in Fig. III*a*, in which H, E and

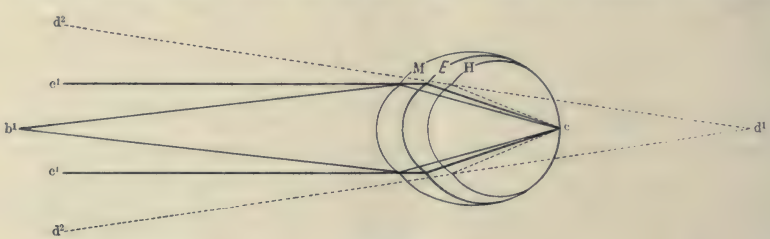

Fig. III*a*.

M represent the positions of the refracting systems in relation to the retina c in each of these categories respectively.

Emmetropia (E). This proposition is simple, since the standard optical eye finds one conjugate focus at the retina (c Figs. III. and IIIa), and the other, the far point, at infinity with parallel rays, c^1 c^1. As the object and the image are on opposite sides of the refracting system, the image is positive and real.

Myopia (*M*). When the retina is located beyond the principal focus of the refracting system c, Fig. III., and finds itself at b, its conjugate focus, representing the far point, will be found at b^1. These conjugate foci, being on opposite sides of the refracting system, are both positive. It must be evident, from law 2 of conjugate foci, that in proportion as b recedes to the right the conjugate focus b^1 will advance towards e, and if such a thing were physically possible and the retina b could remove to infinity on the right, c^1 c^1 Fig. I., b^1 would be found at the c, the anterior principal focus of the refracting system.

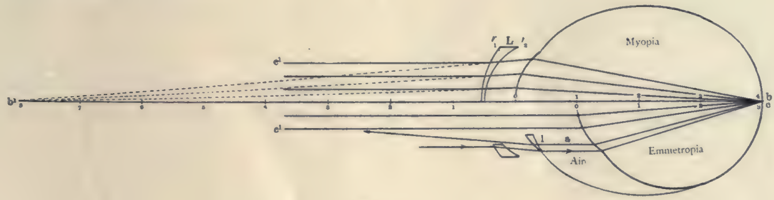

FIG. IV.

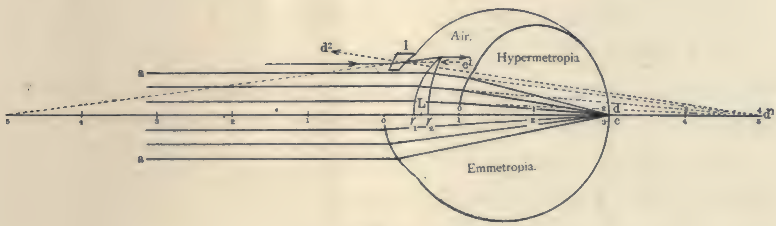

FIG. V.

EXPLANATION OF FIGURES IV. AND V.

These figures showing the relative dioptric values of the emmetropic, myopic and hypermetropic eye, I owe to the ingenious pencil of Mr. C. F. Prentice of New York, who describes them as follows:

"The emmetropic, myopic and hypermetropic eyes are represented as solid bodies of glass with an index of refraction, $n=1.5$, and anterior refracting spherical surfaces of a uniform radius $=1$. Introducing these values into the formula, $\frac{1}{f}=\frac{n-1}{n\,r}$, which expresses the refraction for parallel incident rays, our schematic emmetropic eye is found to have a depth of focus on the optical axis $=3$, (numbers below the optical axis in Figs. 4 and 5.)

"Fig. 4 shows the *emmetropic eye* (lower portion of the diagram), *compared with the myopic eye* (the upper half of the diagram), whose optical axis is longer by a radius of 1; that is to say its depth of focus from the retina, which is common to both, is made arbitrarily $=4$, (figures above the optical axis). The conjugate focal distance anterior to the cornea of the myopic eye is found by the formula $\frac{n}{e}-\frac{1}{a}=\frac{n-1}{r}$ wherein $e=4$ (with in the eye), and a (in the air), are conjugate distances upon the optical

axis. The anteror conjugate focus is found by this formula to be —8, which being counted from the cornea in the opposite direction to the incident rays is established at b¹, which is thereby the far point of the myopic eye. The correcting concave meniscus L, is arbitrarily placed one half radius in front of the myopic cornea, so that the distance of the center of this lens is 7½ units from its focus, which thus coincides with the far point of the eye at b^1. By making the radius r^2 of the posterior surface of this lens =1 unit, we obtain, through the formula for lenses whose thickness can be neglected, $-\frac{1}{F}=(n-1)\left(\frac{1}{r1}-\frac{1}{r2}\right)$; the value of the radius of curvature of the anterior surface, r^1, =1.36, as carried out in the diagram. The convex meniscus l (a section of which is shown at the lower part of the diagram), which expresses the difference between the refracting power of the myopic and emmetropic eye, is shown to have its anterior surface coincident with the myopic cornea, and hence the curvature of this anterior surface =1, and its focus is =8. The curvature of its posterior surface, r_2, is obtained from the formula $\frac{1}{F}=(n-1)\left(\frac{1}{r1}-\frac{1}{r2}\right)$ and becomes 1.33 as in the diagram.

"Fig. 5 gives, in a similar manner, the comparative dioptric values of the *emmetropic and hypertropic eye.* The hypermetropic eye (upper part of the diagram), being shorter by one unit of radius, its depth of focus is therefore only =2, (figures above the optical axis). Applying the formula $\frac{n}{e}-\frac{1}{a}=\frac{n-1}{r}$, in which e=2, we find the conjugate focal distance, a=4, which being counted from the cornea in the direction of incidence is located *behind* the eye at d^1, and is therefore the hypermetropic far point. The convex correcting meniscus L is placed one half unit of radius in front of the cornea of the hypermetropic eye, hence its focus will be 4½ units from d^1, the far point behind the eye. The radius of curvature of the anterior surface r^1=1, the radius of the posterior surface r^2 will be, according to the foregoing formula, =1.8. The concave meniscus l, expressing the difference between the emmetropic and the hypermetropic refraction, has the curvature of its posterior surface coincident with the emmetropic cornea and its radius =1, and has its focus at d^1=5 (figures below the optical axis). Introducing these values in $-\frac{1}{F}=(n-1)\left(\frac{1}{r1}-\frac{1}{r2}\right)$, we find r^1 the curvature of the anterior surface =1.66."

The *degree or amount* of M, that is the difference between E and M, is represented exactly by the difference between the parallelism of the rays, c^1 c^1, Figs. III. and IV. in E, and the divergence of the rays from b^1 in M. This difference is expressed by the power of the convex lens l, as shown in section in Fig. IV, which gives parallel rays a coming from the right a positive focus at a finite distance at b^1 on the left. For example, if the far point be at b^1 10 inches (25 cm.) in front of the refracting system, it means that a lens of 4D positive refracting power is necessary to bring parallel rays a from infinity on the right to a focus at the far point of M, at b^1 on the left. It is commonly said that the myopic eye

exceeds the emmetropic eye in its refraction by that amount. It really, however, only marks the difference in the positions of their two conjugate foci or far points. When, however, it is desired *to convert M into E*, that is to bring infinity on the left in front into conjunction with the retina, it is necessary to render, by the concave lens L, the parallel rays c^1 c^1 artificially divergent as if they came from the conjugate focus at b^1. In the example taken, with the far point at 10 inches (25 cm.), a dispersion (concave) lens of 4D focus placed close to the eye would give the parallel rays c^1 c^1 coming from infinity a divergence as if they came from its negative focus at b^1, 25 cm. in front of it. The focus conjugate to the retina will then have been removed from 10 inches to infinity, the Myopia of +4D will have been neutralized by the —4D lens, and emmetropia will prevail.

Hypermetropia (*H*). In this optical state the conjugate focus, represented by the retina, lies in front of the posterior principal focus of the refracting system at *d* (Fig. III.). Both conjugate foci *d* and d^1 consequently fall on the same side, to the right of the refracting system, and the image d^1 is negative. Since in accordance with rule 1 of conjugate foci it is indifferent in which direction we follow the rays, we will assume, for a simpler demonstration, that the rays start from the conjugate focus on the retina at *d* (Figs. III. and V.).

The rays, then, coming from the retina at *d* do not after refraction by the dioptric apparatus become convergent as in M, nor parallel as in E, but are divergent, d^2 d^2, Figs. III and V, as if they came from the conjugate focus at d^1, which is the far point for that particular optical state.

As *d* recedes from the refracting system towards *c* (Fig. II.) the conjugate focus d^1 also recedes in the same direction, but more rapidly, so that by the time *d* has reached *c*, the posterior principal focus of the system, d^1 has gone to infinity, and emmetropia prevails, since the retina and infinity are once more at conjugate foci. The hypermetropia has therefore disappeared. When, on the other hand *d* moves away from *c* and towards the refractive system, d^1 also advances to the left in the same direction, but at a more rapid rate, and if such a thing were physically possible and the retina

d could reach I, d^1 would also be found there and they would be superposed.

The *degree or amount of H*, that is the difference between the far point of *E* and the far point of *H* in this case is expressed by the power of the concave lens *l Fig. V.* which would render parallel rays c^1 coming from infinity on the right divergent, d^2, as if they came from d^1. The far point and the focus of the lens would then coincide at d^1 and both be negative. If, for example d^1 is 20 inches (50 cm.) behind the refracting system, the difference is represented by a concave (dispersing) lens *l* which, placed close to the cornea, will have a negative focus of 20 inches behind the refracting system. As commonly stated, the hypermetropia has 2D of refraction less than *E*, but what is really expressed is the difference in the position of the conjugate foci or far points in the *H and E*.

When, however it is desired to artificially *correct the H*, and bring the far point d^1 back to infinity, it is necessary to render the divergent rays from the conjugate focus d^1 parallel. This is accomplished by a convex lens, L, of 2D, which, placed close to the cornea, has its focus for parallel rays *a a* at d^1. Then, rays divergent from d^1 will be made parallel and the conjugate focus or far point will be removed from that point d^1 to infinity, *a a*, on the left, and emmetropia will prevail. The hypermetropia of —2D has been neutralized by the +2D. lens and is said to be corrected.

THE CONJUGATE FOCUS IN ACCOMMODATION. (A).

In the static refractive conditions we have been considering, the differentiation of the three categories of *E*, *M* and *H* consists in a determination of the relative positions of the far point and the retina as conjugate foci, the matter of the actual refracting power not entering as a factor. There is however, a state of what is called dynamic refraction in which the eye has added to its refracting power by means of an increased curvature of the lens through a contraction of the ciliary muscle. This increase in refraction serving to adapt the eye to distinct vision at distances within the far point is called the *accommodation* power. We shall find that the laws of conjugate foci apply here as pertinently as we have found them to do in the conditions of static refraction.

When an eye has added to its refracting power, the position of the retina, representing one conjugate focus, remaining unchanged, it is only the position of the other conjugate focus that can be altered, involving a modification in the location of the far point.

As, however, the position of the focus conjugate to the retina in a static refractive condition has been called the *far point* (*punctum remotum*), another name must be used to designate the far point under accommodation. This properly should be termed the *accommodation point* (*punctum accommodatum*) but the term *near point* (*punctum proximum*) has been so long employed that it may be retained as sufficiently descriptive and accurate for practical uses.

We will now examine the effect produced upon the remote conjugate focus by the accommodation in the three categories of static refraction.

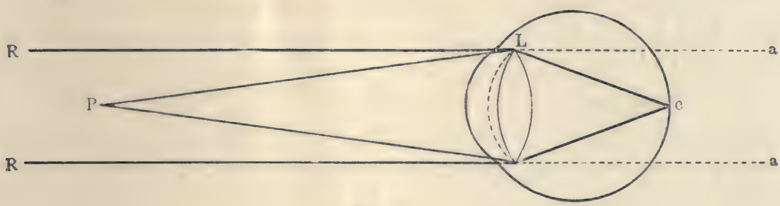

FIG. VI.

A in Emmetropia. In this case the effect of an increase in refraction, the retina remaining fixed, would be to advance the far point from infinity to a finite distance, that is to conconvert E into M. The amount of accommodation then, that is the refractive power added, would be represented by a lens which placed at L would bring parallel rays *a a* Fig. VI. to a focus at the point of accommodation. If, for example, the accommodation point is at P, 8 inches (20 cm) from L, the actual refractive condition would be represented by the value of M with its far point at P, that is by $+5$ D. As this, at the same time, gives the difference between the far point of the emmetropic eye, R, and the accommodation point P, the general formula for the amount of accommodation, which is the same in all three categories of refraction, is $A=P-R$; therefore in this special case $A = 5 - \infty = 5$D.

On the other hand, if we know the amount of A, the

position of P is found by the formula; P=A +R: 5+ ∞ = 5D =20 cm.=8 inches.

A in Myopia. In this case the far point is already at a finite distance. The act of accommodation can then only bring the far point nearer to the eye, that is increase the degree of *M*, and the amount of advancement is measured by the difference in the positions of the far points in the two degrees of *M*. Let R Fig. VII. be the far point in a static con-

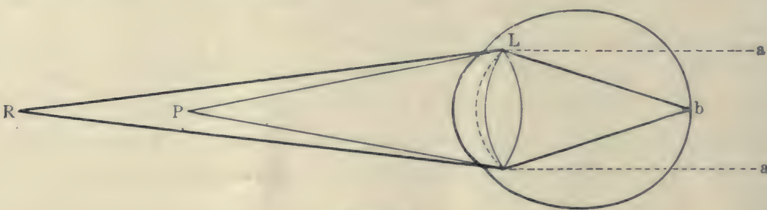

Fig. VII.

dition say at 50 cm. (20 inches) from L, representing 2D of *M*, and P the accommodation point at 10 inches = 4D of M, then since A = P – R: 4 – 2=2D of A. On the other hand, if the amount of *A* and the far point are known, the accommodation point will be obtained by the formula P = A + R; A being 2D and R 2D, P = 4D = 10 inches = 25 cm.

A in Hypermetropia. This case is somewhat different from the other two categories of static refraction, owing to the fact that R is behind the refracting system and has a negative value. In Fig. VIII. R represents the far point of an

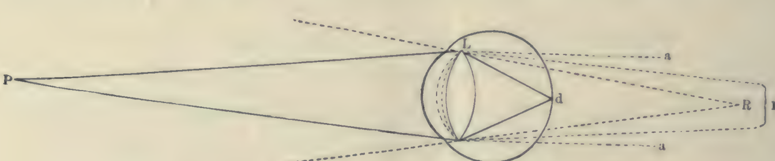

Fig. VIII.

eye with H of 4D, its conjugate focus being 10 inches (25 cm.) behind L. If, by the act of accommodation, a refracting power is added, it will remove the conjugate focus back from R towards infinity, let us say to *r*, at 20 inches behind L. The amount of A will then be measured by the difference in the positions of the conjugate foci R and *r*, that is, the focal distances of the lenses necessary to render rays coming from them parallel. *R* under these circumstances is

represented by 4D and r by 2D; A, therefore $= 4-2 = 2D$. The accommodation point has still, however, a negative value, being behind the refracting system. If r be at 40 inches (1 M.) $A = 4 - 1 = 3D$, the accommodation point yet remaining negative. When r reaches infinity A $4 - \infty = 4D$, the H is abolished and emmetropia will prevail. If r be now advanced by a further increase in refraction from infinity to a finite distance on the *left*, say P, the conjugate focus representing the accommodation point becomes positive and a condition of myopia prevails. If this finite distance is at 20 inches (50 cm.) in front of L, the difference between R and P (r being negative and P positive) is represented by R + P. If P be 2D, $A = 4 + 2 = 6D$, because it has required 4D of A to bring r to infinity and 2D more to bring the conjugate focus to P, 20 inches in front of L. If R is known, P is obtained by the formula $P = A + R$. In this case R is negative, therefore $P = A + (-R) = A - R = 6 - 4 = 2D = 20$ inches.

THE CONJUGATE FOCUS IN OPHTHALMOSCOPY.

It was through a recognition of the laws of conjugate foci as applied to the illumination of the eye that the genius of Helmholtz was enabled to give us the ophthalmoscope. It had, seemingly, never occurred to anyone before him, to take account of the fact that the eye was an optical instrument which acted upon the rays of light coming out of it in the same manner as it did on those going into it—and hence the failure to obtain a view of the bottom of the eye after it had been illuminated. If the fundus of an eye, through an illumination, became the source of emitted rays, he reasoned that the rays should be refracted by the optical system of the eye in passing out through it, and would then proceed toward the conjugate focus of the object from which they came; at which focus an image of that object would be formed. If the eye of an observer could be so placed in the path of those emergent rays that its retina would be at this conjugate focus, then the object would be seen in all its details. The theory of ophthalmoscopy as he unfolded it for the first time, consists simply in bringing the fundus of the observed eye and the retina of the observing eye into the positions of conjugate foci.

As the position of the retina of the observing eye in

respect to the far point or conjugate focus of the observed eye must differ in each of the three categories of E, M, and H, the means by which the far point of the observed eye is brought to the retina of the observer must also be different for each. We will now examine these separately, assuming that the observing eye is emmetropic and in a state of static refraction with its far point at infinity.

Ophthalmoscopy in E. In this case the rays emerge from the observed eye parallel, c^1 c^1 (Figs. III. and III*a*,) coming from the fundus c of the emmetropic eye E. The conjugate focus is therefore at infinity. As the observing eye placed in the path of these rays also has its far point at infinity the two retinæ will be at conjugate foci, and a clear image of c will be formed on the retina of the observer. It will also be noticed that the far points in both (infinity) correspond, which must follow always when the two retinæ are at conjugate foci.

Ophthalmoscopy in M. Here, the far point being at a finite distance, the rays from the fundus emerge convergently towards the conjugate focus at b^1 (Figs. III. and III*a*). The emmetropic observing eye when placed in the path of these rays can not focus them on its retina since it is adapted only for parallel rays. In order that it may so focus them the rays must be made parallel. This can be done by the interposition of a concave lens L (Fig. IV.) of such strength as shall give the rays emerging convergently towards b^1 a parallel direction, c^1 c^1. As b^1 is the negative focus of this lens, its strength also marks the degree of M of the observed eye. By this it will be seen that the ophthalmoscope becomes an optometer for measuring the degree or amount of M. Example: If the retinæ of the two eyes are brought into the positions of conjugate foci, as indicated by the formation of a clear image of the fundus of the observed eye on the retina of the observing eye, by a —4D lens placed close to e, behind the ophthalmoscope, we know that this lens has rendered parallel the rays converging towards b^1, which is the far point of the observed eye, and at the same time is the negative focus of the lens, namely 10 inches, which is 4D. This lens of —4D, through which the fundus is seen clearly, is therefore the correcting lens of the M.

Ophthalmoscopy in H. In this catagory where the far point is behind the refracting system at d^1 (Figs. III. and IIIa) the rays from the fundus emerge divergently, d^2 d^2. The emmetropic observing eye placed in the path of these divergent rays can focus them on its retina only after they have been rendered parallel. This, however, may be accomplished by the interposition of a convex lens L (Fig. V.), whose focus for parallel rays, a a, is at d^1. The two retinæ are then placed at conjugate foci (infinity) and the details of the fundus of the observed eye are distinctly pictured on the retina of the observing eye. Example: The details of the fundus are clearly seen through a +2D lens. The conjugate focus of the observed eye is then 20 inches in front of the lens at d^1 behind the refracting system. Neglecting any difference between the eye and the position of the lens, the far point of the eye will fall at this focus, and the H will be 2D.

When the observing eye is not emmetropic, the conditions are somewhat changed, but the law still holds, and it is yet possible for an ametropic eye to see the fundus of another ametropic eye distinctly while both are in their static refractive state. This can only occur, however, when the far points of the two eyes happen to fall at the same conjugate focus.* Example: Suppose that the far point of the myopic eye, b^1 Fig. III., is 60 cm. in front of e. If now a hypermetropic eye with its far point at 50 cm. behind its refracting system, d^1 Fig. IIIa, were placed 10 cm. in front of this eye, the far point of both would fall at the same place, that is 60 cm. in front of e, the two retinæ would then be at conjugate foci, and the image of the one would be clearly pictured on the other. The fundus of a myopic eye is the only object in nature that a hypermetropic eye can see without the exercise of its accommodation power, since nowhere else in nature do we have convergent rays.

On the other hand, and similarly, a myopic eye with its far point at b^1 100 cm. from e, Fig. III., placed 10 cm. in front of a hypermetropic eye with its rays coming from the retina divergent, d^2 d^2, as if they came from its far point, d^1, Fig. IIIa, 90 cm. behind its refracting system, will have a distinct view of the fundus d, since the two far points b^1 and d^1 will then fall together and the two retinæ be at conjugate foci.

If the observing eye of either category be possessed of accommodation power it is still possible to bring the far point to the same position as that of the observed eye, provided the latter has a conjugate focus farther from the eye than the former. Thus, an emmetropic observing eye can, by advancing its far point from infinity to a finite distance in front of it, bring this conjugate focus to the negative far point of a hypermetropic observed eye; and a myopic observing eye by increasing its myopia through its accommodation and thus advancing its far point, can bring its conjugate focus to fall at the negative far point of a hypermetropic eye of a higher degree than its own M; and the hypermetropic observing eye can, through its accommodation, bring its far point from a negative position back to infinity, where it will be at conjugate focus with the emmetropic eye, and by a still further increase of A can bring its far point to a finite distance that shall correspond to the far point of another, though less, degree of hypermetropia. In practice, however, it is always best to render the observing eye emmetropic by means of suitable correcting glasses.

This method of ophthalmoscopy in which the two retinæ are brought into the positions of conjugate foci, and the one eye looks directly into the other is called the *direct method*, and as the objects at the fundus are seen in their natural positions the image is said to be *erect*.

Ophthalmoscopy by the Indirect Method. In accordance with the laws of conjugate foci, there must be formed in the air at the far point of an illuminated myopic eye, an inverted image of the fundus of that eye in all its details. If an observer places himself at a sufficient distance from this aerial image so that his far point, either static or by accommodation, shall coincide with this image he will be able to see it distinctly. This principle is used in another method of ophthalmoscopy, which is called the *indirect* method, since it is the image of the fundus of the eye under observation and not the fundus itself which is observed; and since the image is formed *inverted*, it is so-called in contradistinction to the erect image just described. This is only practically possible of course in myopia of high degrees, where the far point is very near the eye under observation. It is possible, however, to render, arti-

ficially, any eye myopic and bring its far point close to the eye by the inter-position of a strong convex lens (usually about 20D), in the path of the emergent rays. This will bring the conjugate focus of an emmetropic eye with an inverted image of the fundus to two inches in front of the lens. Another emmetropic eye at a distance of 18 inches will then be able, by means of its accommodation, to bring its far point to the position of this image, and the image of this image will thus be pictured on its retina. The position of the image will be closer to the lens when the rays come from the eye under observation convergently as in M, and farther when they come divergently as in H; the exact position in any case depending, of course, on the position of the conjugate focus of the eye that is being examined.

THE CONJUGATE FOCUS IN SKIASCOPY (THE SHADOW TEST.)

The laws of conjugate foci as we have found them to apply in all the foregoing methods for determining the optical condition of the eye, hold equally good in this method, though we shall encounter some differences in their application. While in the direct method of ophthalmoscopy, for example, the observing eye seeks to have an image of the fundus of the eye under observation pictured distinctly on its retina, in skiascopy, the details of the fundus are not desired, and the object of observation is the shadow edge of an aerial image* of a bright spot, which is thrown by the ophthalmoscopic mirror on the fundus of the observed eye.

This aerial image, real or virtual, being formed by the refracting system of the eye, lies necessarily at the conjugate focus of the fundus. That to which the observer chiefly directs his attention is the apparent movement of the shadowy edge of this bright spot across the pupillary field of the observed eye as compared with a rotation movement of the mirror giving the illumination. Simple as the method is in practice, its optical principles may seem, at first sight, somewhat complicated, but they are easily resolvable by the laws already exposed. The phenomena differ as a concave or plane ophthalmoscopic mirror is employed. We will consider those with *the plane mirror* first.

*For this reason the incorrectness and absurdity of the term "retinoscopy" must be apparent.

When a plane mirror *m* Fig. IX. is used, the real *source of illumination* is an image L^1 of the flame L situated as far behind the mirror *m* as the flame L itself is in front of it. This *flame image* L^1, in keeping with the well-known laws of reflection, *always moves in a direction opposite to that of the*

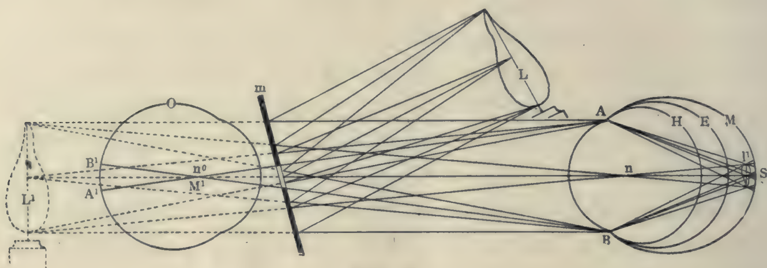

Fig. IX.

mirror rotation; when the mirror is rotated to the right, the flame image moves to the left, and *vice versa.* The *spot of illumination* S, made by this flame image on the fundus of the eye under observation by its refracting system, is positive and inverted, the same as l^1 which is the intraocular image of L^1, and therefore must *move in a direction the opposite of its object, the flame image* L^1; when the flame image moves to the left, the bright spot moves across the fundus to the right, and *vice versa*, that is *in the same direction as the mirror rotation.* When in its turn this *bright spot becomes the object* and a source of illumination on the fundus, *an image of it, real or*

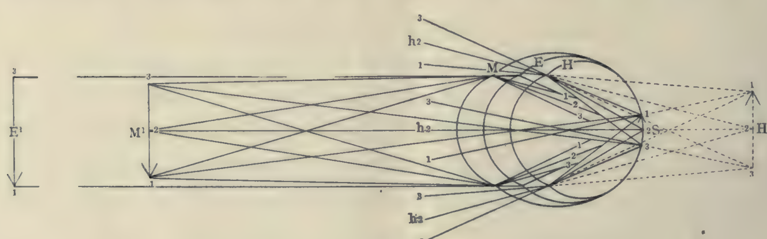

Fig. X.

virtual, is formed by the refracting system at the conjugate focus of the eye.

When the eye is myopic, M, Fig. X. this aerial image of the bright spot S is formed, of course, at a finite distance, the far point of the eye, and is positive and inverted, M^1. When the eye is emmetropic, E, this image lies at infinity, E^1, also in

front of the refracting system and is likewise positive and inverted. When the eye is hypermetropic, H, with its conjugate focus behind the retina and on the same side of the refracting system as the bright spots on the fundus, the image H^1 is virtual and erect, the rays, h^2 h^2 h^2, coming from the eye divergently as if from a real object at its negative far point H^1.

The *movements* of these images in respect to the movements of the object S will be as follows: In E and M, the movements of E^1 and M^1 will be *against* the movements of S, being on opposite sides of the refracting system from S, and therefore *against the mirror rotation.* In H, on the contrary, the movement of H^1, it being on the same side of the refracting system as S, will be in the *same* direction as S and also in the *same direction as the mirror rotation.*

The apparent *direction of movement to the observing eye*, placed in the path of the rays emerging from the observed

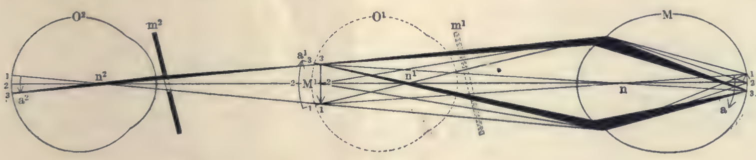

FIG. XI.

eye, however, will depend on the position of the nodal point of the eye in relation to the conjugate focus of the fundus of the observed eye—that is, on whether the observing eye receives rays which come from a real aerial image of the bright spot formed in front of its nodal point, or rays which proceed from the bright spot to form an image behind its nodal point by its own refracting system.

When the conjugate focus or far point of the observed eye, M, Fig. XI. falls *behind the nodal point* n^1 of the observing eye O^1 there is formed there a real and inverted image M^1 of S, which is positive. Now this image may be anywhere between n^1 and infinity behind O^1, depending of course upon the refractive condition of M or the position of O^1 in respect to M. But within these limits no matter where it is formed, whether on the retina, in front of, or behind it, its movements, as perceived by the retina of the eye O^1, are always in the same direction, and just as it would perceive the motion of any object in space in front of it. Though

this is called the *erect* image, it is really formed inverted on the retina, just as the images of all objects in front of the eye are, but in accordance with the law of projection they are perceived as erect, and all movements of S to the right are perceived by O¹ as to the right and *vice versa*, and of course *with the mirror rotation.* The relative rate of motion of the image M¹ as compared with the mirror rotation, and the distinctness of the shadowy edge of the image of the bright spot S, must differ as M¹ is removed backward from n^1, but this does not affect the general direction of the movements of M¹ as perceived by O¹. The observing eye, therefore, will bring parallel rays forming E¹ Fig. X., divergent rays h^2 h^2 h^2 and rays convergent to all points *beyond the position of its nodal point* n^1 Fig. XI. to a focus somewhere behind its nodal point, and in all these conditions the apparent movement across the pupil will be *with* the *mirror rotation.*

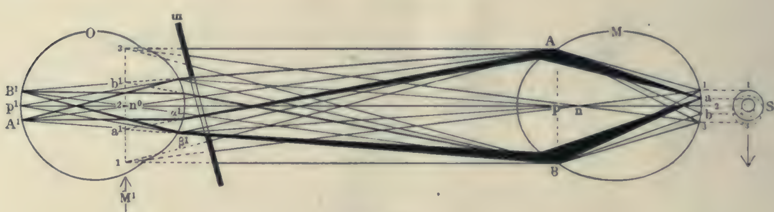

Fig. XII.

When the *conjugate focus falls in front of the nodal point* n^2 *of the observing eye* O² Fig. XI., there is formed there a real inverted image, M¹, of the bright spot S. This image being on the opposite side of the refracting system of M moves always in a direction the *opposite of* S, *and likewise of the mirror rotation.* When S moves down in the direction of the arrow a, the image M¹ moves upward in the direction of the arrow a^1. The observing eye O² will perceive this movement exactly as it would the movement of any other object moving in the same direction in front of it. Hence in O² the shadow moves *against*, whereas in O¹ it moves *with* the mirror.

When, however, the observing eye O Fig. XII. is so placed that the *conjugate focus of the observed eye, M, falls exactly at its nodal point* n^0 *there is no movement observed*, but only a diffuse steady illumination with no outline, however extensively the mirror is rotated. The reason for this is as follows:

As we have seen, the flame image L^1 Fig. IX. of a certain magnitude has always an image l^1 of a definite and proportionate size, made by the refracting system of the observed eye. The pencils forming this image make the bright spot S on the fundus, which is always blurred in outline except when l^1 happens to fall exactly on the fundus. So long as the pupil of the observed eye is fully illuminated during a rotation of the mirror, there is formed, by the refracting system of this eye, an image 1 2 3, M^1 Fig. XII. of the bright spot S at the nodal point n^0 of the observing eye. This image is always larger than the hole in the mirror, (the latter has been purposely exaggerated in the drawing). Now in order that any specific direction of movement be noted it is necessary for the shadowy edge 1-3 of the image M^1 of the bright spot S, to pass across the pupil of the observed eye. Hence the appropriateness of the term Skiascopy (σκια, a shadow, and σκοπειν, to examine).

In the case where the image M^1 falls at the nodal point n^0, the image of the upper edge, 1, of S falls at 1 of M^1. The pencils of light which go to form the image of 1 at M^1, however, are cut off by the mirror surrounding the sight-hole and do not enter the eye O at all, and therefore no image of the edge of the bright spot S is perceived. It is only the pencils coming from *a* in S, much within the limits of 1, that pass along the lower edge of the sight-hole and enter the eye O to form an image at a^1. When the bright spot S moves, say, downward in the direction of the arrow, *a* and 1 move downwards also, synchronously, another point between *a* and 1 taking the place of *a*, which will still form its image at a^1. But no movement downward of S, with a full illumination of the pupil, is sufficient to bring 1 down to the position occupied by *a*, and have its image at a^1, within the eye O. The same holds good also in the upward movement of the points *b* and 3, on the lower limits of the bright spot S, 3 never reaching up to the place occupied by *b*. Consequently the shadowy edge 1-3 of the bright spot S can never have its image within the eye of the observer O, and therefore it can never be seen to pass across the pupil, to whatever extent the mirror may be rotated. As some point of S always has its image at M^1, there is always a steady illumination perceived by O during all mirror rotations.

Those pencils of light from a of the bright spot S which are projected to A and B, marking the outline of the pupil of the eye M, are directed, after their refraction, to a^1 and β^1. After entering O these rays are brought by its refracting power not to a^1, but after crossing each other to the points A^1 and B^1, on the secondary axes A^1 n^0 A and B^1 n^0 B, which pass through the nodal point n^0 to corresponding points A and B of the pupil of M. As these converging pencils, refracted at a^1 and β^1, cross each other within the eye to reach the points A^1 and B^1, they do not unite anywhere to form an image of a of the bright spot S. They simply become widely separated pencils, falling on opposite sides of A^1 p^1 B^1, *which itself becomes the image of the pupil* A p B of M; the observing eye in this method of examination always accommodating for the pupil of the observed eye. The points A^1 p^1, B^1 of O are conjugate to the points A, p, B of M, respectively.

Expressed in simple terms, a and b have their conjugate foci at a^1 and b^1 of M^1, situated at the nodal point n^0 of O, while A B, the pupil of M^1, has its conjugate focus and image at A^1 B^1 of O. On comparing diagrams XI. and XII. it will be observed that the pencils from 1 and 3, corresponding to the shadowy edge of the bright spot S, enter the observing eyes O^1 and O^2 of Fig. XI. through the nodal points n^1 and n^2 to form their images 1 and 3 in each eye respectively, whereas in Fig. XII. these pencils from the shadowy edge of S never enter the eye, being cut off by the mirror, so that no image of them is formed in the observing eye.

It will be seen from this that the nodal point of the observer's eye is the point of reversal from the movement with, to the movement against, the mirror rotation; making the position of the observer's nodal point in relation to the conjugate focus of the observed eye, the key to the situation.

(*Continued next issue.*)

REPORT OF SEVEN EXTRACTIONS WITH HAAB'S ELECTRO-MAGNET.

By N. J. WEILL, M. D.,
PITTSBURGH, PA.

WHILE extractions of iron or steel from the interior of the eye with the Haab Electro-Magnet are frequent, yet nearly every case presents something different from the preceding one.

Occasionally we see cases of injury to the cornea and lens of years' standing made by splinters of iron or steel, the Hirschberg magnet having been used, now in the state of *siderosis bulbi.* Evidently the small magnet was not strong enough to extract these splinters, when its point was sunk into the eye to or even *beyond* the posterior lens capsule. Oculists who use the small magnet *exclusively* have told me that when iron or steel was lodged within the eye through a corneal wound, it rarely penetrated to the vitreous. The giant magnet teaches me, that this is not the rule but the exception—most splinters lodging in the eye are found in the vitreous. In thirteen[1] of my cases the splinter was located once in the anterior chamber, twice in the lens, and ten times (77 per cent.) in the vitreous. In nine cases (69 per cent.) the wound was corneal, in four scleral. My results thus far are: enucleation in one case; shrunken, blind, quiet eye in three; traumatic cataract in five, three of which are operable and two are doubtful, in the one the pupil cannot be dilated (Case VI. of this series) and the other I have not been able to examine recently (Case I. of this series); and normal or nearly normal vision in four (one after needling operation[2]). What a boon this giant magnet is, locating and extracting deeply-seated splinters almost as easily as those situated in the anterior chamber or lens.

In the extraction of splinters from the eye with the giant magnet, it seems to me, we cannot do better than follow the rules laid down by Haab.

It is only a few months[3] since I published a report of five (5) cases of extraction, where I had used Haab's magnet, so that my only excuse for this paper describing the course of seven additional cases, is to bring to the attention of every oculist the advantages of the giant magnet. Its use is not limited to the eye, but with it we can locate and remove small

particles of iron or steel from *other* parts of the body much handier than with the forceps.

Case I. July 8, 1902, J. H. æt 23. About 2½ hours before injured his right eye while chipping.

Examination of Right Eye:—Vertical linear wound of more than the lower half of the cornea. An iridectomy was made by the splinter as regular as scissors can cut it. Cataracta traumatica. With the strongest current and with the point of the magnet one cm. from the center of the cornea, the splinter pushes its way through the lens, and is then extracted through the original corneal wound with the weakest current. The splinter is 7x6x¼ mm. and weighs one grain. Adherent to it, with the loupe, a few cilia can be seen, which it must have taken into the vitreous with it when entering the eyeball. May be it deposited a cilium in the vitreous!

July 9, 1902. Eye is doing well.

March 28, 1903. From one, who saw this patient this day, I learned that no secondary operation had yet been executed.

Case II. September 5, 1902, J. C. M. æt. 21. While striking a wedge with a hammer about 2½ hours ago, something hit the right eye.

Examination of Right Eye:—Blood oozing is from a horizontal linear wound about 5 mm. in length, in the posterior temporo-ciliary region. Vitreous bloody. With the strongest current I extracted through the original gaping scleral wound a piece of steel 4x2x1½ mm., weighing one grain. I sutured the wounded sclera.

September 27, 1902. Healing prompt. T—1 to —2. Pupil reacts promptly, directly and indirectly. Projection normal. Starts to work.

October 16, 1902. Right eye violently red and painful. Lower iris drawn in. T—3. Scleral scar drawn in.

March 16, 1903. Right eye quiet since about November 10, 1902. T—3. Left eye normal.

Case III. October 11, 1902. M. D. æt. 33. It is about 5 hours since he was chipping a casting when his left eye was hurt.

Examination of Left Eye:—Vertical wound of lower cornea with iris and swollen lens in the same. A glittering mass is visible deeper in the lens. A splinter 5½ x3½ x2 mm.

was extracted through the original corneal wound with the strong current.

October 22, 1902. On account of increased tension I tapped the anterior chamber and allowed much of swollen lens to escape.

March 28, 1903. He has used atropin constantly since injury. Cataracta secundaria fairly dense. Tn. Projection normal. I expect to do needling later.

CASE IV. November 18, 1902. E. D. æt. 14. In hammering a nail 7 ½ hours ago something hit his left eye.

Examination of Left Eye:—Small wound of the limbus corneæ below and a glittering mass on the iris in the lower anterior chamber. I extracted the same through the original wound. It carried a little iris with it into the wound. It would have been better to have made a new corneal incision above and thus avoided carrying the iris into the wound. The splinter is 2 mm. long and weighs about one-half grain.

November 24, 1902. From his physician I learned that the healing was uninterrupted.

CASE V. January 31, 1903. C. J. O. 39 years. On January 30, 1903, while chipping face of a stairway something struck his right eye. He immediately went to an oculist, who put the point of a small magnet through the wound into his eye, but found no iron.

Examination of Right Eye:—Lids somewhat swollen. A healing wound about 6 mm. long in naso-ciliary region. Pupil medium wide, from drops used hourly at home. Iris discolored greenish (copper corrosion). A yellowish red mass in lower temporal vitreous. With the strongest current in the direction of the center of the cornea, about 10 cm. from the point, patient has a sharp pain over the middle of the upper lid and hyphæma appears from lower temporal iris, which bulges forward. I cannot get the corpus alienum through the pupil as it catches in folds of the iris. I made an incision in the temporal limbus corneæ and a small iridectomy. After enlarging the corneal incision I succeeded in extracting a bronzed cast iron splinter, 7x5x2 m.m., weighing 3 ¼ grains.

February 23, 1903. Healing prompt. Tn. Has annoying flimmering before eye.

March 28, 1903. About one week ago the eye was red

and painful, is now quiet, but shrinking. T—3. The original ciliary wound is drawn in.

Case VI. March 11, 1903. A. J. McM. æt. 42. About 12 hours before, while chipping, injured the left eye and now cannot see anything. The right eye was injured 15 years ago by an explosion.

Examination of Left Eye:—Semi-circular wound in upper nasal cornea. Cataracta traumatica. With strongest current 6 to 7 m.m. distant from the center of the cornea, the patient has a sharp pain in the eye and hyphæma from the lower iris is apparent. I enlarged the original corneal wound. With the eye directed downwards, the magnet point on the wound, I extracted the splinter. It is coated with a sticky, clear substance (lens or vitreous), measures 5x3x2 mm. and weighs one grain.

March 31, 1903. Pupil does not respond to abundant atropin. Cataracta traumatica.

Case VII. March 16, 1903. H. F. æt. 19. While forging March 12, 1903, thought something struck his left lower lid. Next day he noticed the sight was impaired.

Examination of Left Eye:—Eye quiet. Small corneal scar upwards about one millimeter in length, wound through lens with posterior cortical cataract. With ophthalmoscope in indirect picture, three papilla breadths below the papilla, in the vitreous, just in front of the retina, there is a silvery triangular piece of steel. It is about one-fifth the size of the papilla. With the strongest current, the point almost touching the center of cornea, the splinter is brought behind the lower iris, which it pushes forward before it. I could not bring it through the pupil with weaker currents. I made a small iridectomy downwards and applied the magnet point to the incision in the lower limbus corneæ. The splinter must have slipped through the incision *unseen*, as the magnet thereafter was absolutely negative.

March 20, 1903. Wound closed. Lens becoming more opaque. I tried the magnet again with the same negative result.

Haab has said that one cannot get a magnet too powerful, applicable to all cases, and this appears correct. Further, it is an established fact, that a foreign body once having become "fixed" in an eye, no magnet that has yet been devised will

extract it. In this connection I cite the following recent experience:

March 28, 1903. H. I. G. æt. 43, is referred to me because his left eye, for the past two days, has been red at times and "waters" much, especially when his head is held at a certain angle.

HISTORY:—This eye was injured 2½ years ago by a splinter from a file, which his helper struck with a mall. The patient says the piece of the file, which hit his eye, was about the size of a small grain of wheat. A small hand magnet charged with 110 volts, direct current, was tried at that time with negative result.

Examination of Left Eye:—Vision which I am informed was $^{20}/_{20}$ a month after the injury is now $^{20}/_{50}$. The eye is without external inflammation. The original wound was in the nasal limbus corneæ. Behind this there is a hole in the iris and a segment of opaque lens. The vitreous is cloudy and the papilla seen with difficulty. I ordered atropin to be instilled six to eight times daily.

March 30, 1903. The eye feels good, has not "watered" or been red since atropin has been used. With dilated pupil the lens in general is somewhat hazy, which shows that a lens once injured always sooner or later becomes entirely opaque. To-day the vitreous is much clearer and the papilla quite distinct. In the lower nasal retina a shining foreign body, the piece of steel, can be seen. It is about the size of the papilla. A retinal vein passes undisturbed *in front* of it. The *appearance* of this piece of steel, after being located in the retina 2½ years, is precisely that of a fresh splinter. In the place of retinal hæmorrhages there is a small heap of brown pigment in the retina just above the corpus alienum.

Magnet Test:—The strongest current applied to the cornea has absolutely *no* effect on the splinter. If this eye continues to annoy the patient, I shall attempt to dislodge the splinter by applying the current directly over it.

REFERENCES.

1*a*. Extraction of Iron from the interior of the Eye by the Haab-Electro-Magnet. The Ophthalmic Record, Feb. 1901. (One case).

b. Two-fold use of Haab's Electro-Magnet in Eye Surgery. Pennsylvania Medical Journal, Pittsburgh, Pa., August, 1902. (Five cases).

2. Case IV. under 1*b*.

3. 1*b*.

DISCUSSION ON DR. ALT'S PAPER ON EPISCLERITIS.

(See page 101.)

Dr. D. S. Reynolds, Louisville, Ky.—I think one of the unfortunate things in considering this subject is the nomenclature. "Episcleritis" does not mean anything except inflammation on top of the sclera. "Epi" means upon. Episcleritis would necessarily mean something external to the sclera. I watched closely the description and Dr. Alt describes scleritis all the time, and if I caught his meaning, I would say it is the opinion of the writer that scleritis nearly always begins within the walls of the sclera. As the sclera is not disposed in layers, I cannot conceive of a superficial or deep-seated scleritis. It is made up mainly of heterogenons connective tissue fibres, and at the points where the wall is perforated by nerves and blood vessels the nodular masses described by Dr. Alt occur. When you study the course of syphilitic disease in its remote manifestations—that is to say, inherited syphilis—it will be observed that the circumscribed organic structural changes accompany the course of the blood vessels. They have their origin in those parts where there is strong resisting tissue. Here is most likely to be the seat of gummatous deposits. I think a large proportion of the cases are inherited syphilis, beginning as a gummatous formation on the uveal surface. I have a large mass of clinical notes on these cases, and I cannot recall from memory an instance that was not seen in a syphilitic subject. I have not seen it in acquired syphilis, but in children the subjects of inherited syphilis, innumerable times. I have had the same experience in the treatment of scleritis as in the treatment of inherited syphilis in other parts of the body. I employ mercury in small doses, giving strict attention to diet and habits of life, with the design of improving the general condition of the patient. I believe that a great deal depends upon nutritious foods, and the use of mercury in small doses will terminate nearly all cases of scleritis.

Dr. J. O. Stillson, Indianapolis.—This is a very interesting subject and I can but express my high appreciation of Dr. Alt's admirable paper. I feel when I hear him read a paper—and I feel it more than ever this morning—under ob-

ligations to him for the clear and charming manner in which he gives us the picture of this most distressing and unsatisfactory disease. We have all met this disease in the course of our practice, I dare say, and if the experience of the other gentlemen has been anything like my own, I am sure they can bear Dr. Alt out in this seeming quandary as to what the disease really is and what really is the rational method of treatment. It will not do for us to start out upon the gouty and rheumatic diathesis, as we are so prone to do, to clear up the diagnosis, to understand this disease, because that standpoint will fit too many other obscure cases. It will not do for us to classify this as a *terra incognita*, because we are too well acquainted with the land marks and the tissues here. It will not do for us to hold up our hands and declare it is incurable. Eighty per cent of the people have gout or rheumatism, that is, are of a lithic diathesis. Eighty per cent of the people who live to be along towards the fifties have rheumatism, and if we are going to take that as a basis, we can make up our minds we can explain anything on the uric acid diagnosis. It is like the old explanation of glaucoma: we can easily explain glaucoma if we want to take the backward track. But when we come down to the fact that the majority of men (about three-fifths) are hypermetropic anyway, then it will not do to use hypermetropia as a cause of glaucoma. We see it more in hypermetropic people because there are more hypermetropic people. And so, too, on this line, we may well say that we see more episcleritis in rheumatic or gouty people than in those free from this disease, because more people have this disease than do not. So to my mind it is a co-incidence rather than a cause. I do not agree with Dr. Reynolds about it being in so many instances a specific disease. I used to feel that way myself, but I know that I have seen cases where this could not be accepted. I studied a case about a year ago in connection with Dr. Stevenson of Ft. Wayne, in which we found nothing that would lead me to believe it was syphilitic.

Dr. J. A. Donovan, Butte, Mont.—I have had quite a number of cases of this disease and never have been able to connect it with syphilis either directly or indirectly, and I look for it in my patients. Some time ago I had two patients at the same time who had a peculiar odor to the breath

in a warm room, which struck me as peculiar. I noticed the same odor on another patient, and ever since I have made the diagnosis from the characteristic odor of the patient. The last half dozen have had a peculiar odor perceptible. The last I had was a lady who had a history of having been treated for three years by local treatment. I began with one-fourth grain calomel until she had taken three grains every day, and after that phosphate of soda. These are the only patients with whom I have had satisfactory results in this trouble, and so far every one has recovered within five to six weeks.

Dr. Geo. F. Suker, Chicago.—I think this is a very opportune time to discuss episcleritis and scleritis I am sorry Dr. Alt did not say anything definite regarding sodium salycitate. I have several cases at the present time in which part of the cornea is involved, and I agree that we usually have an inflammation of the uveal tract. I have a patient who has had episcleritis for a year, with the characteristic bluish color, and nothing relieved her. As a last resort I started her on the salicylates; and as I am a firm believer in large doses, I ran up to 150 to 180 grains per day. Her pain subsided and she is recovering nicely. She is still taking 60 grains per day with plenty of water. I make the patients take as much water as the skin can hold while taking these large doses. In addition to these large doses, I use the atropine and hot fomentations. This person is making a very fair recovery; the nodules are disappearing, but the bluish cast remains. As to the staphylomatous nodules about the eye, I fully agree with the doctor. I saw one case quite recently with Dr. Beck which has now developed not only a staphyloma but also a glaucoma. She had terrific pains and nothing did any good until she had the large doses of the salicylates. As to the etiology, whether rheumatic or syphilitic, I agree that we can't tell what it is. Some seem to be one and some the other. If you give large doses of sodium salycilate you can possibly exclude a syphilitic basis. Still even in specific cases it is efficacious. Whether the uveal tract is the basis or not, I think Dr. Alt will clear this up for us some time.

Dr. C. L. Minor, Springfield, O.—Recently two young ladies, aged respectively 18 and 20, came to my office with in-

volvement of the sclera. I referred them to the family physician for examination. There was no history of syphilis in either family and no gouty diathesis that could be found. They both had some derangement of the female organs which required operation for correction and soon after these operations the scleritis disappeared and up to the present time has remained cured.

Dr. J. E. Colburn, Chicago.—I would like to offer one suggestion regarding the treatment, and that is the climatic. I have had a few cases and have noticed that the most severe exacerbations usually came, as in choroiditis, in the spring, beginning in March and continuing during April and May. One patient invariably had a return of the attack during these months, and at my suggestion she went to California about mid-winter four years ago and escaped the recurrence. An opportunity occurred for her to go to Hawaii, where she has remained for three years. In a letter from her recently she said she had no return of the conditions. She had the colored spots on the sclera and I had her under observation for a number of years. I tried everything ever recommended for this disease before suggesting climatic change.

Dr. Alt (closing discussion).—I perfectly agree with Dr. Reynolds as to the meaning of the word "epi," but it has been the custom to call the tissue which lies upon the sclera and connects the conjunctival tissue with it, the episcleral tissue. As I have described, and as you see in the photographs, in episcleritis the inflammation lies in this tissue which unites the two membranes together and therefore it is right to call it an episcleritis. In these cases there is no inflammation to be found in the uveal tract. As regards syphilis being the underlying cause in most cases, I may ask in what disease may we not find some form of spyhilis present? How can you prove it and how can you disprove it? Dr. Donovan must have a good sense of smell if he can diagnose scleritis from the odor. At any rate, as he stated that he has been successful with phosphate of sodium, we should give it a trial. Dr. Suker said I had not mentioned salicylates. He was evidently not present when I read the paper. I am sorry that in the whole discussion I have heard only repetition of what I have said, excepting from Dr. Donovan. No one

seems to have better success than I, yet let us hope that the future will bring it. Dr. Minor mentioned the female sexual organs as possibly having some effect. I also mentioned this and said that in one case exacerbations took place with each menstrual period. I also send my patients to the general practioner whenever the eye trouble seems to be connected with some general disease and have them thoroughly examined. With regard to the climatological treatment, I have no experience, but it is interesting to hear Dr. Colburn's statement. It may be that the hot climate in those countries acts as a beneficial factor. Heat or sweating in some cases are very beneficial.

Operation for Detachment of the Retina.—At the meeting (April 24th, 1903) of the Society of Physicians of Vienna (Austria), Dr. Leopold Müller presented a patient on whom he had successfully treated a retinal detachment by means of an operation of his own invention. Up to 1891 the patient had had a myopia of 9 D., when he suddenly became blind in one eye from detachment. One year later, all other methods of treatment having failed, the author operated on that eye, as he has since done successfully in six other cases. After the temporary resection of the temporal orbital wall (after Kroenlein), he cut a piece of sclerotic, 10 by 20 mm. from its anterior temporal part, without wounding the choroid. Near the lowest angle of the wound a small knife was then pushed through the choroid and the subretinal fluid let out while the sutures previously introduced were being tied. Before the operation the patient could count fingers downwards only, while aside from a small central scotoma, he has now a normal field and counts fingers at 3 m. In two other cases the results have remained the same in 11, resp. 15 months. The author is inclined to recommend this method in those cases of high myopia in which the macula is endangered. The refraction in the case presented changed from a myopia of 9 D. to a hypermetropia of 4 D.—*Wiener klin. Rundschau.*

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ORIGINAL ARTICLES.

AN EXPOSITION OF THE PRINCIPLES OF REFRACTION IN THE HUMAN EYE, BASED ON THE LAWS OF CONJUGATE FOCI.

With 17 Original Illustrations.

BY SWAN M. BURNETT, M. D., PH. D.,
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WASHINGTON, D. C.

(Continued from last issue).

In determining the refraction of the eye by skiascopy, we employ the same principles as in all the other methods, namely, by finding the far point of the eye, or the conjugate focus of the fundus. This is not done, however, by determining directly the place where the nodal point of the observing eye and the conjugate focus of the fundus of the observed eye fall together. Since this is at infinity in E and negative in H, it would not be practically possible. Nor is it necessary, since we can artifically bring the far point of any eye to any desired finite distance by the interposition of a lens in the path of the emerging rays, as is done in the indirect ophthalmoscopic method. In other words we can create an artifical myopia at whose far point we can easily place the nodal point of the observing eye, and obtain the phenomena of reversal. Let us suppose that this fixed far point is at 1 *meter* (M=1D) where the observing eye finds itself. The far point of any eye can be brought by means of a proper lens placed just in

front of it to this point of reversal, and the difference between the actual far point of this eye and 1D of M is given by the strength of the auxiliary lens which it is found necessary to place in the path of the rays in order to bring that far point to 1m. The far point of the observed eye is therefore expressed by the difference between the number (x) of the lens and 1D, or x—1 dioptries of refraction, from which the position of the far point is easily found.

Examples:—The observing eye being at 1m. and a lens $x = +$ 1D. being necessary to bring about a reversal of movement, there is emmetropia, since $x-1 = +1-1 = 0$ dioptries of refraction. Hence the far point $= \frac{1 \text{ Meter}}{0} = \infty$ (infinity). If +0.5D is required, then there is $+0.5-1=-0.5$ with a far point $\frac{1 \text{ M}}{0.5}$ at 2 meters, and there is M of 0.5D. If a +4D is found necessary to bring about a reversal, there is $+4-1=+3$D of H, with a negative far point $\frac{1 \text{ M}}{3}$ at 33 cm. behind the observed eye. Should a —3D be required to bring about a reversal, there is $-3-1 = -4$D of M with the far point at $\frac{1 \text{ m}}{4} = 25$ cm. in front of the observed eye, —3D being necessary to extend the far point from 25 cm. (4D) to 1m. (1D). Should the nodal point of the observing eye be placed at 2m. in front of the observed eye, we would have to substitute 0.5D for 1D in the above calculations. If it be at one half a meter, 2D will have to be substituted, etc.

In this method the *accommodation of the observed eye* can, by its action, modify the position of its far point by bringing it nearer, thus increasing the M and adding some dynamic to the static refraction. On the contrary, an *accommodation on the part of the observing eye can have but little effect*, since the amount of accommodation used to fix the pupil of the observed eye, does not materially displace the nodal point of the observer's eye from the actual position of the point of reversal.

Skiascopy With the Concave Mirror: The difference between this method and that with the plane mirror rests on the difference in the positions of the flame image giving the illumination. With the plane mirror, as we have seen, the flame image is as far behind the mirror as the flame is in front of it, and moves always against the mirror rotation. With the *concave mirror the flame image is at the focus of the*

mirror in front of the observer and moves always with the mirror rotation. As a result of this the direction of movement of the bright spot across the fundus of the observed eye with the concave mirror is the *opposite of that* of the flame image and of the mirror rotation, and necessarily the contrary of that with the plane mirror. The direction of the movement of the image of the bright spot at the conjugate focus of the eye, however, remains the same, that is, contrary to that of the bright spot itself, in the case of E and M where the movement is *with* the mirror rotation, while in H it is *against* it. When the observer, then, is at a sufficient distance from the eye under observation to allow the flame image to be formed in front of the observed eye, the phenomena of movements apparent to the observer will be the reverse of those with a plane mirror. In E and H and in M with a far point behind the nodal point of the observer's eye, the movement will be *against* the mirror rotation, in M with the far point in front of the nodal point of the observer's eye, the movement will be *with* the mirror.

With the exception of this change in the direction of the movements across the pupil, the rules for the estimation of ametropia are the same as with the plane mirror. When, however, the concave mirror is approached sufficiently near to allow the flame image to fall behind the optical center or nodal point of the observed eye, the bright spot and the flame image will move in the same direction, and the phenomena will be the same as with the plane mirror.

THE CONJUGATE FOCI IN ASTIGMIA (*) (ASTIGMATISM).

In the optical state of the eye known as astigmia (or more commonly as astigmatism), the two principal meridians at right angles to each other are of unequal refractive power and each has conjugate foci of its own which can be studied separately from those of the other. These two foci, conjugate to the retina, are on planes perpendicular to the visual axis, which are separated the one from the other by what is called the *focal interval of Sturm.* It has been customary, hitherto, to

*This word is not derived, as is usually stated, from *στιγμα-στιγματος*, which means a *blemish* or *spot*, but from, *στιγμη-ης*, which means a *point*. Hence *astigmia* is etymologically more nearly correct than *astigmatism*, though it will probably never supplant the term so long in use.

consider the focal interval of Sturm as applied solely to the two posterior conjugate foci in their relations to the retina, the anterior conjugate focus being fixed at infinity.

Astigmatism has been divided in accordance with this view into; 1. *simple astigmatism*, in which one focus is on the retina, E, Fig. XIII., and the other either (a) in front of the

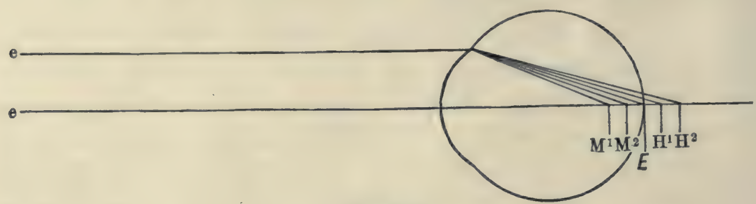

FIG. XIII.

retina M^2, (myopic astigmatism), or (b) behind the retina H^1 (hypermetropic astigmatism); 2. *compound myopic astigmatism*, where both foci M^1, M^2 are in front of the retina; 3. *compound hypermetropic astigmatism* where both foci H^1 H^2 are behind the retina; 4. *mixt astigmatism*, where one focus M^2, is in front of, and the other H^1, is behind the retina.

In keeping with our general plan, however, we can with equal propriety regard *the focal interval of Sturm as separating the other conjugate foci, the position of the retina remaining fixed.* The dimensions and position of the interval of Sturm on the visual axis, outside the eye, must vary, therefore, with the varying position of the conjugate foci of the two meridians, in respect to the principal plane of the eye as in ordinary spherical refraction.

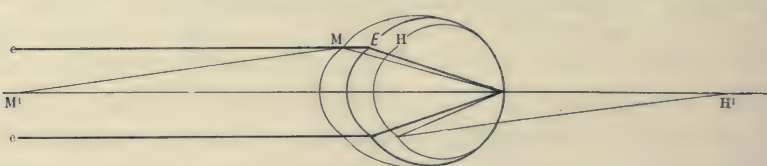

FIG. XIV.

Studying them, then, from this standpoint we have: 1. The conjugate focus of one meridian at infinity e e Fig. XIV., the other at a finite distance M^1, *simple M astigmatism.* 2. One conjugate focus at infinity e e, the other behind the refracting system at H^1, *simple H astigmatism.* 3. Both

conjugate foci at a finite distance, but separated by a focal interval M^1 Fig. XV., corresponding to the meridian m^1, and M^2 corresponding to the meridian m^2, *compound M astigmatism.* 4. Both conjugate foci behind the refracting system, but with a focal interval H^1 corresponding to the meridian h^1, and H^2 corresponding to h^2, *compound H astigmatism.* 5. One conjugate focus in front of the eye at M^1 Fig. XIV., the other at H^1 behind it, the focal interval being M^1 H^1, *mixt astigmatism.*

When the two conjugate foci are, by suitable optical means, brought together, the focal interval is abolished, and the astigmatism is said to be corrected. The optical agent used for this purpose is a cylindrical lens which refracts the light only in the meridian of its curvature, the light falling in the direction of its axis being unaffected. Such a lens is placed before the eye with its curvature corresponding to the meridian whose

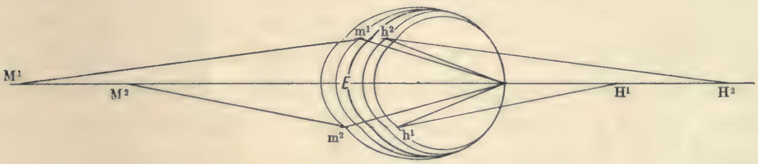

Fig. XV.

refraction it is desired to effect, and it should be of such quality and power as to bring the conjugate focus of that meridian to the same point as that of the other meridian.

Examples:—There is simple myopic astigmatism, with one conjugate focus at infinity (*e e* Fig. XIV), the other at M^1, 20 cm. in front of the principal plane. A concave cylinder with the (negative) focus of its refracting meridian at 20 cm. (–5D), placed with this meridian corresponding to the faulty meridian of the eye, (or what is the same thing, with its axis corresponding to the axis of this meridian), will render parallel rays divergent as if they came from its focus, which is, at the same time, the conjugate focus of this meridian, and thus set this conjugate focus back to infinity, where the conjugate focus of the other meridian is found. The astigmatism has now been corrected and E prevails. One meridian h^1 with its axis at 180° (horizontal), has its far point, Fig. XV, at 50 cm. ($H^2 = 2D$), and the other, h^2, with its axis at 90°

(vertical), 20 cm. behind the refracting system, $H^2 = 5D$. The focal interval is then represented by the difference in the focus of the two lenses, representing these two foci: $+5 - +2 = +3D$. A $+3$ cylinder, then, with its axis at 90° corresponding to the axis of the meridian of least refraction will remove the focus of this meridian from 20 cm. ($+5$) back to 50 cm. ($+2$), and the focal interval will be abolished and the astigmatism corrected. The common conjugate focus, however, still remains at 50 cm., H^2, behind the eye, and there will be yet a H of 2D present which can be overcome and the eye rendered emmetropic by a spherical lens which acts upon both meridians equally, and of such power as to shift the conjugate focus from 50 cm. back to infinity. The strength of this spherical lens is $+2D$, which must be added to the cylinder ($+3$) in order to correct the total ametropia; the formula for the glass being $+2 \bigcirc +3.\ 90°$. One meridian has its far point at M^1 Fig. XIV, ($M=2D$), and the other at H^1, ($H=3D$). The astigmatism $M^1\ H^1$ is therefore $=3+2=5D$ (3 being negative). As the H is negative, it will require a $+3D$ cylinder to bring H^1 to infinity, for this meridian, while it will require a $-2D$ to bring the conjugate focus of M^1 to infinity in the meridian at right angles to it. If the axis of H is at 90° and that of M at 180°, the formula for the correcting lens would be $+3$ axis $90° \bigcirc -2$ axis 180 .

Determination of Astigmatism by Skiascopy. The movement of the bright spot on the fundus being necessarily in the same plane as the mirror movement (at right angles to its rotation axis), it is only the refraction in a single meridian corresponding to that plane that is determined in skiascopy. As it is possible, however, to make the axis of mirror rotation correspond to any meridian of the refracting system, it is desired to examine, it is easy to determine separately the refraction in any two meridians at right angles to each other as we have it in astigmatism. To this end, it is only necessary to find the separate points of reversal for the meridians of least and greatest refraction, (always at right angles to each other), to know the value of the focal interval of Sturm. Knowing, then, the far points of the two meridians, the strength of the cylindrical lens required to bring them together marks the degree or amount of astigmatism.

Example:—Meridian with its axis at 90° requires +3 to bring about a reversal at 1 M, that with its axis at 180° requires a + 2. There is, therefore, 1D of H, with its axis at 180°, and 2D of H, with its axis at 90°. The astigmatism is therefore +2—1=+1D axis 90°, with a general H of 1D common to both meridians (compound H astig.)

Determination of Astigmatism by the Ophthalmoscope. In the determination of general ametropia by means of the ophthalmoscope (direct method), we saw that when the two retinæ were brought into the positions of conjugate foci, and the details of the fundus of the observed eye were pictured distinctly upon the retina of the observing eye, the ametropia was abolished, and the focus of the lens through which this was effected, marked the far point of the observed eye (the observing eye being emmetropic). In astigmatism, there being two foci, corresponding to the meridians of least and greatest refraction at right angles to each other, it is necessary to determine the conjugate focus or far point of each of these meridians separately. This is done by taking as the objects of observation, the retinal vessels running in various directions across the background of the eye. In astigmatism the vessels whose general course corresponds to one direction will be seen more distinctly than those running in a direction at right angles to this. These directions will correspond to the *axes* of the two principal meridians, respectively. It now remains to find the lens through which the vessels corresponding to the axis of each of these meridians are seen most distinctly, separately, and the difference in their power will express the amount of astigmatism.

Example:—The vessels running in a vertical direction are seen most distinctly with a +3D, while those running in a horizontal direction are seen distinctly with a +1D. There is then H=3D with the axis at 90° (vertical), and H=1D with the axis at 180° (horizontal). There is then a general H=1D and an astigmatism of 3—1=2D axis 90°.

APPENDIX.

In order that the action of these laws governing the refraction of the eye, in the various manners described in the foregoing thesis, may be brought together under a general

mathematical formula applicable to all possible conditions, we add an exposition, based on the simple formulæ for conjugate foci given by Gavarret, (*Les images par reflexion et refraction*). In this treatment we accept as fixed values, the optical constants of the reduced eye of Donders, where the posterior principal focus for parallel rays A F^1 (Fig. XVI.), $=f^1=20$ *mm.*, and the anterior principal focus A $F=f=15$ *mm.* B and C indicate the positions of other conjugate foci, and the relation of these to the principal foci F and F^1 have the values l and l^1. The varying values of l and l^1 are counted from F and F^1 in such manner that all values of l to the left of F are considered as positive (+), while all values to the right of F are negative (—). All values of l^1 to the left of F^1 are counted as negative (—), while all values to the right of F^1 are counted as positive (+). It will be seen that F^1 marks the position the retina occupies in emmetropia, being at the posterior principal focus for parallel rays.

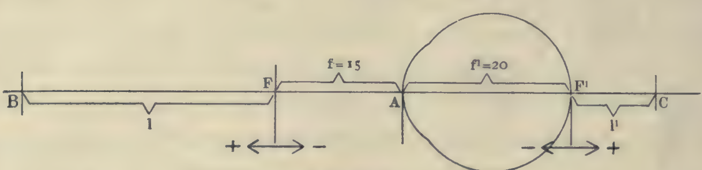

FIG. XVI.

The general formula for determining the values of l and l^1 is, $l\,l^1=f\,f^1$ (1). The values of f and f^1 being fixed, any change in the value of l must be associated with a change in the value of l^1, and *vice versa*, and in accordance with the following formulæ, deduced from (1); $l=\frac{f\,f'}{l'}$ (2), $l^1=\frac{f\,f'}{l}$ (3).

Examples: $l=o.$; $l^1=\frac{f\,f'}{l}=\frac{15 \times 20}{0}=\frac{300}{0}=\infty$. That is when B is at the anterior principal focus F, the conjugate focus, C, is at infinity.

Similarly when $l^1=o$, C being at F^1, by formula (3) B or the other conjugate focus is found at infinity. So likewise when $l=\infty$, $l^1=\frac{300}{\infty}=o$. B then recedes to infinity and C advances to F^1.

When l is positive, to the left of F, l^1 is also positive and to the right of F^1, and *vice versa*. When, however, l^1 is negative and to the left of F^1, l is also negative and to the right of F, and *vice versa*, and both are on the same side of the principal plane A.

Examples: $l=200$ *mm.*, $l^1=\frac{300}{200}=1.5$ *mm.*, C is then positive and 1.5 *mm.* to the right of F^1 and, $20+1.5=21.5$ *mm.* behind A. Conversely when C is 21.5 *mm.* behind A, B or the far point will be 200 *mm.* in front of F, or 215 *mm.* in front of the principal plane A. This will correspond to a myopia of 4.5D.

When $l^1=-1$, C being 1 *mm.* to the left of F^1, $l=\frac{300}{-1}=-300$ *mm*, B the far point will then be 300 *mm.* to the right of F, that is $-300+15=-285$ *mm.* behind A, which represents 3.5D of H. When $l^1=-20$ *mm.*, C will find itself at A, the principal plane, and l will be $\frac{300}{-20}=-15$ *mm.* Since F A is equal to 15, B will find itself also at A, and the image and object will be superposed.

It will be seen from the examples given that a variation of 1 *mm.* in the position of C in its relation to F^1, the position of the retina in E, equals about 3.5D in the position of the other conjugate focus or far point. When l^1 is positive it is M, when it is negative it is H.

CLINICAL EXPERIENCES IN THE TREATMENT OF PHORIAS AND TROPIAS.*

By J. ELLIOTT COLBURN, M.D.

FIRST I desire to call your attention to a case of heterophoria in a neurasthenic patient with the following history:

H. M. Male, aged 35 years, decorator by occupation. Mental confusion, pain in the orbital region following or attending the use of the eyes, inability to fix the eyes for any length of time upon his work or a printed page, vertigo and scintillating scotomata. Nutrition of the body good.

Refraction:—Vision equaled $^{20}/_{60}$ in the left, $^{20}/_{200}$ in the right. Under mydriasis, left equaled $^{20}/_{70}$, right $^{20}/_{200}$. With —1. spherical combined with a —1.25 cyl. ax. 180 for the left and —1.50 spherical with a —1.25 cyl. ax. 180 for the right, vision equaled $^{20}/_{20}$ in each eye.

*Read before The Western Ophthalmological, Otological and Laryngological Society at Indianapolis, Ind., April 9, 1903.

Name, Mr. H. M.
No.

Date		Jan. 1903					Feb.		March							
		21	22	23	25	27	4	5	6	13	14	18	19		25	
Hyperph. R.	½	0		0			0	0	½	½	¾	1¼	0		3	0
Hyperph, L		0		0				0							Cyclophor. neg.	
Esophor		9	9	5	0	0										
Esoph'. in A		0														
Exophor		0							2¼	2¼	3	2½	4			0
Exoph. in A	3	8	8	7	8	8	8	7½	16				16	Grad. Tenot. Ext. Rec. O. S.		
Abduction			2	5					7	7			8		0	
Adduction				30					28	28			28		30	
Sursum, R		1½											4			
Sursum, L		1½											2			
Parallax T.st. Hyperph																
Parallax T.st. Esophoria		7														
Parallax T.st. Exophoria																
Rest Prisms										R.H.¾		R.H. 1½				
		10	0	5			7	7		Ex. 1		Ex. 1				

Remarks: (+2)

In this case the only satisfactory reading of the muscle condition was obtained after he had been for two months under the influence of moderate doses of bromides, arseniates and extracts of malt, with out of door life and light active exercise. The patient was found to have exophoria equaling 4°, in accommodation 15°, right hyperphoria 2½° and a cyclophoria equaling —4° in the left eye.

I have long found it of advantage in the study of uncertain cases to use bromide of sodium in ten grain doses three times a day and have usually found that if true hyperphoria existed the results of the test would become uniform.

At the suggestion of Dr. Oscar King this patient was given arsenauro and fattening diet. The cyclo-exophoria was corrected by a tenotomy of the left externus when the hyperphoria gradually disappeared.

Three cases of general chorea, mother and her two daughters. There was no personal history in these cases which would indicate the cause of the condition and it was only by a study of the mother's history that I felt warranted in correcting the heterophoria in the children, hoping for a favorable result.

First Case. The mother, Mrs. C., aged 32 years, general health good from childhood with the exception of general chorea which began at her 12th year and continued with varying intensity until her 17th year, when she began to suffer from migraine and daily headaches. This condition ob-

tained until she came to me in 1893. She was refracted and at that time was relieved to a slight degree of her headaches. The attacks of migraine and occasional frontal headaches were sufficiently troublesome to have her return to me a year later for review. I then found that the glasses as first given were correct but that she showed, as she had done at the time of her first visit, a left hyperphoria of 4° with occasional diplopia when fatigued. Ten days later the error equaled six degrees, and under rest prisms used for three hours the diplopia became constant. There was no declination and no lateral errors. The left hyperphoria was corrected by a graduated tenotomy, the first result of which was a right hyperphoria of one degree, which gradually disappeared.

Three months following the operation she reported complete freedom from headache. I prescribed during the past year presbyopic correction.

Since the first operation she has used her eyes as she had never been able to do before, and without discomfort. Her general health, mental and physical, has improved.

Her two daughters began with chorea at twelve and ten years of age, though not at the same time, that is, they occurred about two years apart. Their errors of refraction were corrected, and later left hyperphoria 3° and 3½° being corrected the chorea disappeared. Up to date of writing there has been no manifestation of headache or migraine.

A troublesome feature in these cases was the frequent occurrence during the tests and at other times of transient scotomata, not scintillating, lasting from just a moment to five or ten minutes. These attacks were never, so far as I could discover, preceded by a flash of light or followed by headache, usually occurred in one eye at a time, and were incomplete and irregular in form. After the heterophoria was corrected the attacks of scotoma gradually disappeared. It is likely that the condition resembled ophthalmic migraine and later, as in the mother's case, would have become pronounced.

The value of the rest prism and the development of the latent or total error is a question which interests everyone who enters upon the study of heterophoria. The error may be manifest or latent, either in part or totally. The construc-

tion of the head, the expression, pose and history may point to an error of direction, but every test result be negative. From the fact that the results of the tests are negative I do not judge that the patient is free from muscle imbalance, but that I have not been able to discover it by the usual tests, and may never be. As we can not put the muscle at rest and have to resort to other means of determining the nature of the trouble. Rest prisms may be used to aid in the detection of the error and the determination of the degree.

We now place prisms in position to partially correct manifest or to favor the supposed error. In an hour the test is again made and the manifest condition noted. Should the prism be rejected after repeated trials I should render a Scotch verdict of not proven. If, however, the prism was not only tolerated but a slight increase, one or two degrees, accepted, a greater and greater amount may be brought out by slowly adding ½, 1, 2 or more degrees as the tests indicate, always keeping a little below the error shown at the last reading. The following case will illustrate:

Miss H. D., aged 20 years, a stenographer, had been repeatedly refracted, under atropin gave a progressive myopia —1.50 each eye. Attempts were made to relieve a troublesome asthenopia, pain in the back of the head and beginning anæmia from malnutrition. The accompanying history chart can well illustrate the method used in the study of this case. In this case the readings were taken every hour or half hour:

Name, Miss H. D. Age 20. Stenographer.
Refraction, —1.75 corrected right and left.

	Date	August 8							9			10	11	12							18		3
		A.M.						P.M.						A.M.			M	P.M.					
		9	10	10:30	11	11:30		1						9	10	11	12	1					
	Hyperph. R.	0	0	0	0	0	0	0															
	Hyperph. L.																						
	Esophor	1	3	6	9	12	16	16	16	12		16	16	16	16	16	16	16			½	½	1½
	Esoph in A.																						
	Exodhor																			2			
	Exoph. in A.																						
	Abduction																						
	Adduction	3	3			3	3	3	2	Red glass Diplopia	2		2						P. Tenot. Left Rec. Int.			8	8
	Sursum, R.	42	42			42		42	48		50		50										48
	Sursum, L.																						
Parallax Test.	Hyperph																					0	0
	Esophoria		15			16	16						15									0	0
	Exophoria																					0	0
	Rest Prisms	1	2	5	9	11	15	0	8	0	0	15	16	16	16	16	17	16					0

Remarks: No declination. Head posed to left.

My reason for securing the total result by a single tenotomy will be found in the pose of the head and the limitation of the abduction of the left eye. Five months subsequent to the operation the young woman reported that she was free from headache and able to do her work without discomfort. The phoria was completely relieved, and rest prisms used as at the time of the visit failed to develop an error greater than at the time of the last preceding visit.

The condition of heterotropia and heterophoria or voluntary or alternating tropia or phoria I have found difficult to study and still more difficult to treat. The nearer together the refractive conditions the less difficulty in correcting the error.

Amblyopia from whatever cause always complicates the study and final judgment as to the advisability of attempting a correction after the twentieth year of age. Eccentric pose of the head, while a suggestive aid to diagnosis, is a troublesome complication, as it prevents the best results in both tenotomies and advancements.

January, 1891, Miss E., aged 20 years, was referred to me by my friend, Dr. E. I. Kerlin, for persistent headache through and back of the eyes, back of the head and in the temples. The temple and occipital pains were almost constant. From the constant discomfort her general nutrition had been lowered and she was reduced in flesh and in blood count. As no other cause for the head pain was found by the family physician, an examination of her refraction was suggested. This examination was conducted under atropin mydriasis and right hyperopia. + 50 sph., left + .75 sph. + .13 cy. ax. 90° were found to correct her errors of re-refraction. Left hyperphoria equaled 2°, esophoria equaled 6°. Adduction equaled 14°, abduction equaled 10°. Right sursumduction equaled 1°, left sursumduction equaled 3°. No cyclophoria (Savage test). Correction for the error of refraction was given and modified at various times during the following three months, change of surroundings, a trip to the country, tonics, etc., etc., were ordered without in any way relieving the symptoms, though she could not be comfortable without her glasses. Seven months later the hyperphoria was corrected without benefit. Later the externi were tenoto-

mized, resulting in a slight over-correction of the error equaling ½°. Glasses were again modified without relief. I now advised the patient that I was at my limit, so far as the eyes were concerned, and asked for a consultation first from an expert diagnostician and later by an ophthalmologist, if no general cause was found. During a general physical examination it developed that both kidneys were afloat and that after manipulation the patient was free from pain and discomfort, only to relapse as she moved about. This was a failure not of diagnosis and treatment of ocular errors, but of diagnosis of the conditions causing the nervous symptoms. Up to my last knowledge of the patient nothing had been done toward fixing the kidneys, and the patient is still a sufferer from eye strain symptoms. One other case of floating kidney has come under my observation with symptoms simulating eye strain.

Complete Tenotomy for the Correction of a Phoria. Mr. M., aged 28 years, was referred by a neighboring practitioner with the following note:

The patient is coming to Chicago to make it his permanent home.

"I am referring a Mr. M. to you for the correction of a left hyperphoria, which was originally a left cataphoria, but owing to the slipping of my sutures the present condition resulted. The patient had 18 degrees of cataphoria at first and desiring to test the method proposed by an eastern ophthalmologist of cutting the tendon completely off in cases of four degrees or more, and thinking I was safe with that large amount, I followed the suggestion, with about six degrees remaining, but this gradually passed over to twenty-four degrees of the present trouble. I then attempted to advance the inferior rectus and got a good result, but the tissue did not seem to unite readily and my sutures were slipping, so I weakened the superior. The correction was only temporary when the hyperphoria gradually returned, and as a last resort I again advanced the inferior, but my sutures again slipped and the union was slow."

When the patient came to me, as nearly as I could make out, he had on the perimeter 24° (geometrical) of L hyperphoria. The thickening resulting from the last operation had not fully disappeared, but it was not until I had opened

the conjunctiva that I realized that it would have been better to have delayed the operation until a later date. My attempt to secure the muscle in its proper position proved a partial failure, as in January just past I found 20° (prism) of error remaining, but by posing his head he was able to secure single vision. In January last I was able to reattach the muscle, leaving but one degree of left hyperphoria.

I can not from a personal experience condemn complete tenotomy for the correction of a phoria. I can only say that I do not feel justified in attempting it nor would I attempt a tenotomy of the inferior, either partial or complete. I have found it difficult to guage the effect of an operation on the inferior muscle. Stevens has pointed out the difficulties attending operations on these muscles. In my opinion from what I know of this class of cases an advancement is the better operation. While more difficult, the results are positive and, if properly executed, satisfactory.

Mr. L. K., aged 24 years, a student, had been refracted under atropin. Glasses had been prescribed and frequently changed. The asthenopia headache and general neurasthenia were in no way benefited, though he could not work without his correcting glasses.

Right +1.

Left +1. with +.75 cyl. ax. 90°.

A diagnosis of hyper-esophoria equaling $^{4'}\llcorner 8^{\circ}$ had been made and prisms given for its correction. With all this there was no lessening of his symptoms, and a year of out of door life was advised. As this would delay him in obtaining his degree he came to me in consultation. I found refraction and muscle imbalance as reported and advised a tenotomy for the correction of the hyperphoria and later the esophoria. The case was further considered and ten days later found a hyperphoria of 8° with a varying esophoria. Without the correction of the error of refraction I could not make out a declination either by Stevens or Savage tests.

A graduated tenotomy of the right superior rectus was done and an immediate measurement taken. There was but slight change in the phoria. Another investigation was made and it was found that a central band far back had escaped the Stevens hook. When this was severed an over-correction

was obtained which necessitated the use of a restraining suture to prevent too great a displacement, as I desired to advance the muscle in the fellow eye. In this case the muscle was heavy in its center and the lateral wings were thin and unusually broad. The check band which prevented the recession of the muscle was thin and unusually broad in its ocular attachment.

The vertical plane of the right eye was nearly the same as that of the plane of the face, five degrees, while the corresponding plane of the left eye was thirty degrees, the normal in a symmetrical face being fifteen degrees. Plane B, see the *Journal of the American Med. Assn.*, Oct. 18, 1902. (Fig. 1).

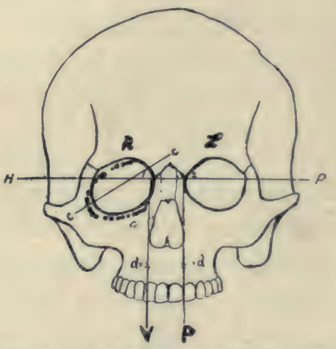

FIG. 1.—H P, Horizontal plane; 1, 2, attachments of the orbicularis palpebrarum; V P, verticale plane; d, d, canine fossa; c, c, direction of largest diameter of the orbit.

In operating, particularly for the lateral errors, I have found it best to pay full respect to the total error as shown by the rest prisms, correcting it by advancement or tenotomy.

For the correction of cyclophoria I prefer in low degrees associated with hyperphoria the graduated tenotomy, while in high degrees of declination the advancement after Stevens' method, or as preferable to anchor the muscle to the tendon of the adjacent wing of the rectus muscle.

Mr. G., aged 32 years, had been examined and error of refraction corrected under atropia used four or five days. There was great difficulty experienced in correctly locating the axis of a low cylinder for the right eye, it being alternately received at 90, 75 or 105 degrees. There was a slight exophoria at twenty feet and pronounced exophoria at the proximal point. A minus cyclophoria of five degrees was con-

stantly observed under the Savage test. There was distortion of the page with correction before the eyes and alternate acceptance and comfort, and rejection and discomfort with the lenses at 90 degrees.

After some weeks observation, ocular gymnastics and general ocular rest the patient was operated after the Stevens method and the glasses accepted at 90 degrees without return of asthenopia or headache. In this case there had been in the later hours of the day a facial tic which has completely disappeared.

My first experiences with the Stevens method were not markedly successful, as I did not appreciate the importance of placing the stitch in the stronger portion of the annular ligament.

It seems to me important to call attention to the fact that heterophoria in any form can not be studied or treated without the exercise of extreme patience, whether they prove to be operative or non-operative cases.

Dr. H. S. B. I called attention to this patient in June, 1902, at the meeting of the American Medical Association, and herewith offer the report then made and the supplementary report:

Case 4.—Mr. B. Aged 24, robust general health, sturdy physique, has from early childhood suffered from headache, periodic asthenopia usually during school terms and has attacks of petit mal, but during the past three years these have been infrequent as he has been engaged in active out-of-door life. His military training has forced him to hold the head in nearly the primary position. He is always conscious of an effort to secure and maintain binocular single vision. With the slightest effort diplopia results and the disengaged eye either turns upward and outward or downward and outward, as the case may be, to a sufficient degree to rid the patient of the confusion of double vision. I have never been able to satisfactorily estimate the total error. Refraction R, $V={}^{20}/_{20}$, L, $V={}^{20}/_{20}$. Atropia R, $+1.={}^{20}/_{20}$, L, $+.75={}^{20}/_{20}$. Head in primary position, field of fixation normal, adduction $=26$, abduction $=16$. R sd. $=$? L sd. $=$? Orbital planes: Right eye plane A 25, plane B 20, declination $=25$. Left eye plane A 12, plane B 10, C 15. You will observe that the plane A

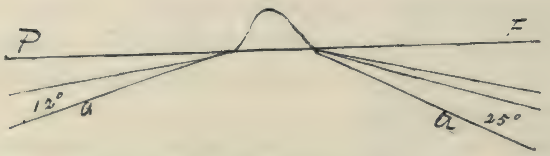

FIG. 2.—A. P. Left orbital angle; A. F. right.

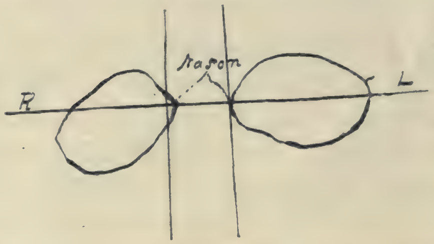

FIG. 3.—Non-symmetrical position of bases of orbits.

(Figs. 2 and 3) in the right eye has a greater angle by 13 than the left, and the plane B is greater by 10 (Figs. 4 and 5). We would class his head as broad and flat if viewed from the right side; if viewed from the left side, long and thin. When attention is relaxed the habitual pose of his head is to the left with

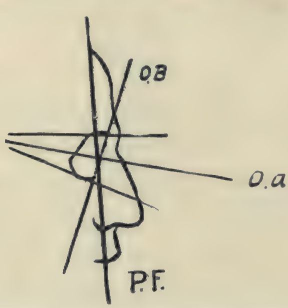

FIG. 4.—Right side of face; P. F. vertical plane of face; O. A. orbital axis; O. B. orbital base.

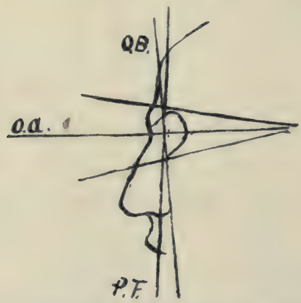

FIG. 5.—Left side of face; P. F. vertical plane of face; O. A. orbital axis; O. B. orbital base.

the chin depressed. An effort was made about six years ago to correct the hyperphoria by a graduated tenotomy and advancement, but shortly after the tenotomies were made the patient was called into active service and the error has not been taken under consideration until quite recently.

The status of the case when he came to me again in the autumn of 1902 was as follows: Head in primary position. Perfect parallelism. Red glass showed left hyperphoria of nine degrees which quickly passed twenty degrees. Exophoria equalled 14°. Could fuse by effort and fix with the left eye and the right would assume the hypophoric position equaling 9°. The Maddox rod, Stephens phorometer or parallax test gave about nine degrees of left hyperphoria. A partial tenotomy of the superior rectus reduced the error to 7°, and two months later an advancement of the right superior rectus gave perfect correction of the hyperphoria. Three months later a partial tenotomy of the right externus and an advancement of the right internus corrected the exophoria, giving him two degrees of esophoria.

In this case tenotomies in themselves were of little use. The advancements only were of avail. It must take months of careful use of the eyes to do away with the bad habits of fixation and the disturbance of the nerve centers governing the recti muscles. Training the muscles, by prism or other exercises, does not count for much. They have the power to overcome high prisms, but the effort resulting from sustained fixation under difficulties resulting from asymmetrical formation and direction of the orbits is too great even for well-trained nerve centers and muscles.

The basis for the error in this case was undoubtedly anatomical. And while an unusually sturdy physique and nervous make-up enabled him to do a large amount of work, yet with each added year he realized the increasing labor and discomfort of the handicap.

DISCUSSION.

Dr. Ferd C. Hotz, Chicago.—The diagnosis and management of phoria cases is certainly one of the most perplexing problems oculists have to deal with. As the descriptions of the essayist of his careful and persistent examinations show, we cannot come to a conclusion in such cases by one or two examina-

tions. There are so many points to be considered in relation to the muscles of the eye, as to whether they are a disturbing element; whether the discovered phoria is a real thing and one that we can change. That alone requires great care and patience and perseverance to find out; and before we have satisfied ourselves that it is actual, we certainly have no right to interfere, especially by the mechanical means of an operation. With our present facilities we can certainly discover phoria in almost every patient, just as we can discover a refractive error in almost every eye. The question is: Is the phoria a source of trouble, an etiological factor in the complaints of the patient? If a doctor limits his observations to the eye and works out phoria only, without taking into consideration the numerous other conditions of the nervous system and of the whole body in every way, he is apt to encounter dangerous pitfalls and make most serious blunders. I wish to relate a few such observations which are most instructive to me. To the younger members it should be a warning not to look at the eye with blinders on.

Some time ago a college student consulted me with the history that he had been suffering with asthenopia, for the relief of which he had been submitted to three or four graduated tenotomies, but without relief. There was some esophoria present, two degrees. Both eyes were myopic. The fundus showed marked irritation of the choroid. I put him on a rest cure under atropine, and in four or five weeks he was able to use his eyes with ease.

Another case shortly afterwards in my clinic was that of a patient with slight paresis of the externus of the left eye. He said that three months before a tenotomy of the superior rectus had been performed on that eye—for the correction of what I do not know. The man had apparently perfect health, was strong, robust and intelligent. I made the remark to my class that a paresis of an ocular muscle coming on in a man of middle age in apparently good health, where we have no traumatism and no specific history, always ought to induce us to investigate as to the possibility of beginning locomotor-ataxy. When I made this man stand up with his eyes closed, he began to sway in a few seconds, so that he would have fallen had not the students supported him. The knee-jerk was entirely gone. The diag-

nosis of locomotor-ataxy was confirmed. In that case, operative interference with whatever might have been the matter with the superior or inferior rectus was absolutely uncalled for. But some doctors are sometimes so absorbed in what they see in the eye that they forget that the eye is, after all, not disconnected from the rest of the human body.

Dr. W. L. Dayton, Lincoln, Neb.—With all honor to my friend Dr. Hotz, who, I think, is an anti-phorist, I will say that I certainly believe in phorias. I feel just so sure as we can have talipes, that we can have an insufficiency of the ocular muscles. Patients certainly come to us with asymmetrical faces, and in these cases we frequently find shortening of one muscle, or one set of muscles, or insufficiency of several sets. The question is, what shall we do, not, whether this condition exists. The question is whether the thing to do is a tenotomy or treatment of the systemic conditions. The question is as to the remedy to provide. I have served a rather long apprenticeship in graduated tenotomies, and I have advanced, resected and done several other methods in order to correct the condition I have found existing. I can certainly say that there is no operation I have found that will answer in all cases. We must select our cases for graduated tenotomies, resections and advancements.

Dr. Hotz.—It is a great surprise to me that my remarks were interpreted as my being opposed to operative treatment of heterophoria. This was not the purpose of my remarks. I cannot cover the entire ground in the few minutes allowed, but I simply took up one point in voicing a few words of caution. I fully acknowledge the existence of heterophoria. I am treating such cases and am not opposed to operation where needed.

Dr. Colburn (closing discussion).—I do not know that I have anything to offer in reply, as there has been, so far, no criticism of my statements. I do not feel like criticising the operation of complete tenotomy for heterophoria. I have never practiced it myself and do not know the results, but I would criticise the tenotomy on the inferior rectus muscle. You cannot estimate the effect of either advancement or tenotomy, and I would warn any one from touching in any way the inferior rectus muscle.

THREE ESSENTIAL POINTS IN THE OPERATION FOR CICATRICIAL ECTROPIUM.

By F. C. HOTZ, M.D.,
Prof. of Ophthalmology and Otology in Rush Medical College, Chicago.

SOMEBODY once has said blepharoplastic operations look very pretty—on paper, but in reality the results are anything but pleasing and satisfactory. The operations for cicatricial ectropium are not excepted from this criticism. The restored lids often look hideous, and still oftener are everted again after a few weeks or months. But we can overcome these drawbacks, if we pay strict attention to the following points:

1. The proper division and fixation of the skin flaps.
2. The selection of the most suitable material for covering the lids.
3. The shortening of the overstretched lid border.

1. *The Proper Division and Fixation of the Skin Flaps.* The greatest difficulty we have to contend with in the operations for cicatricial ectropium, is the tendency of the shrinking skin-flaps to evert the lids again. As all transplanted flaps will undergo more or less shrinkage and as the lid border is least capable of offering any resistance to the traction of the shrinking flap, a re-eversion of some degree is almost inevitable as long as the transplanted flap is attached to the non-resisting lid border on the one side and to the non-yielding skin of the forehead or cheek on the other side, because the lid border is then exposed to the full traction force of the shrinking flap. It is evidently much easier for this flap to pull the lower lid down than to draw the skin of the cheek up, and therefore re-eversion is an especially common occurrence after the operation for ectropium of the lower lid.

It is plain, then, that to prevent the re-occurrence of ectropium we must place the lid border beyond the reach of this traction force. And this can be accomplished if instead of covering the whole wound with one skin flap we make use of two flaps, a small one which is to cover the lid surface only and which we will call the *lid flap*, and a larger one which is to be spread over the remaining wound area; and furthermore if we make provision that the contraction of the larger flap can have no effect upon the lid flap.

In ectropium of the upper lid this point is gained if the

upper edge of the lid flap (Fig. 1 ba.) is firmly attached to the upper border (a) of the tarsus, while its lower edge (b) is united with the free margin. The lid flap is thus anchored above and below to the tarsus and its contraction cannot turn the lid over because to do so the traction force must have a fixed point of purchase outside of the lid. The shrinkage of the other skin flap (ac) which has its point of purchase (c) outside of the lid, however, cannot disturb the position of the lid margin, because its pulling force is expended entirely on the upper tarsal border (a); for, thanks to its firm union with

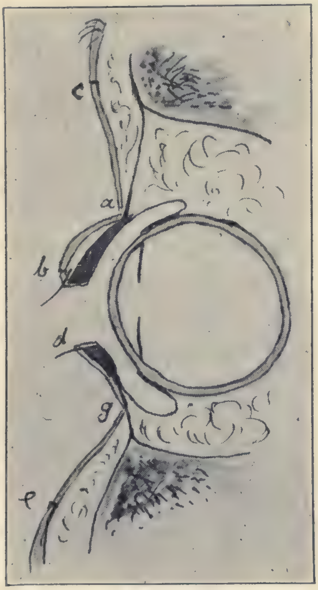

FIG. 1.

this border, the lid flap cannot be stretched or drawn upward by the contraction of the other flap and as as long as the lid flap cannot be drawn up, the lid border is effectally guarded against re-eversion.

In ectropium of the lower lid, the same principle is adopted for the protection of the lid against the vicious traction of the shrinking flap. But we must bear in mind that the tarsus of the lower lid is very small and narrow and that normally the lid skin reaches farther down than the lower border of the tarsus, to a slight furrow a little above the infraorbital margin, (Arlt's tarso-malar furrow) where the integument passes from the upright plane of the lid into the sloping sur-

face of the cheek. This normal boundary line between the lower lid and cheek must be re-established by our division and fixation of the skin flaps; and the lid flap (dg) therefore must not be united with the lower border of the tarsus, but fastened to the tarso-orbital fascia (at g) in a line a little above the infraorbital margin. As the fascia is, as it were, the anatomical continuation of the tarsus, the lid flap adherent to the surface of the tarsus and fastened to the fascia cannot evert the lid. And the shrinkage of the large flap (ge) covering the wound of the cheek, is prevented from pulling on the lid margin and causing re-eversion of the lid, because its traction cannot reach beyond the firm union of the lid flap and fascia. So strong is the resistance of this union that you may draw the skin of the cheek down as much as you please and you will not succeed in everting the lid.

2. *The Selection of the Most Suitable Material for Skin Flaps.* If it is our ambition to obtain the best possible results in ectropium operations—and nothing less ought to satisfy us—we cannot be contented with the mere reposition of the lids, but should strive also to restore as much as possible their natural appearance. The lids contribute more to the expression of the eye than the eyeball itself; and the slightest alteration of shape and outlines, or the least impediment of motion seriously mars the expression of the face. This is a very important point and should always be taken into account when we choose the material for our flaps. The normal integument of the lids is a thin and delicate skin of such perfect flexibility and adaptability that it allows perfect freedom of motion and accommodates itself readily to the numerous slight changes in contour so characteristic for the various facial expressions. In order, therefore, to gain a perfect cosmetic result we must select as a substitute for the lost lid skin, a material which possesses the same qualities; it must be thin, light and adaptable. It goes without saying that the thick skin of the forehead, temples or cheek does not possess these qualities; and therefore flaps from these regions should not be transplanted upon the lids. Besides the transplantation inflicts additional wounds upon the face and I hold we should avoid marring the face by unnecessary scars. The use of Wolfe's flaps taken from the arm avoids this latter objection, but they, too, are usually so thick that like the peduncu-

ulated flaps, they make a heavy, clumsy-looking lid. These two kinds of flaps are as well suited for a substitute of lid skin as shoe leather would be for kid gloves.

A good and suitable material for lid flaps which answers all the requirements is the cicatricial skin usually found in the immediate vicinity of extensive ectropium. I have shown in 1896* that this skin can be successfully transplanted and makes a perfect lid skin. In ectropium of the lower lid this cicatricial skin can nearly always be utilized for the lid flap. In ectropium of the upper lid it can sometimes be used when the eyebrows are absent. If on account of the eyebrows the cicatricial skin is not available, a Thiersch graft is the only suitable material. It accommodates itself to the surface of the lid, brings out its contours perfectly and does not in the least interfere with the free movements of the lid.

3. *The Shortening of the Elongated Border of the Lower Lid.* As the diameter is shorter than the half circle, so in the case of complete ectropium the free lid margin of the lower lid turned from its almost straight line between the canthi into a long downward curve is elongated a good deal; and after being held in this abnormal state for a long while it will not recover its normal length when the lid is replaced. The elongated margin of the lower lid will not closely fit the curvature of the eyeball and will drop away from it, as in a senile ectropium. The reposition of the everted lower lid, therefore, cannot be perfect and permanent, unless the overstretched lid margin is reduced to its proper length. In several instances I did not do that, because the lid margin appeared to lie in perfect apposition to the globe; but every time I had cause to regret this omission and had to correct my mistake by a second operation. I, therefore, regard the shortening of the elongated border of the lower lid a very essential point in the operation for cicatricial ectropium.

And now, after having so strongly emphasized the importance of these several points, I wish to indicate briefly the plan of operation based upon the views expressed in the foregoing remarks. As the operation is not alike in details for both lids, I believe it is better for a clear understanding to describe the method for each lid separately.

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*Journal of the American Medical Association, September 19, 1896, and Archives of Ophthalm. Vol. 25, No. 3.

Technique of the Operation Upon the Upper Lid. If the eyebrows are partly absent and there is a good expanse of cicatricial skin above the everted lid, we cut from this cicatricial skin the lid flap in the following manner: *"From a point (a Fig. 2) about 5 millimetres above the inner canthus

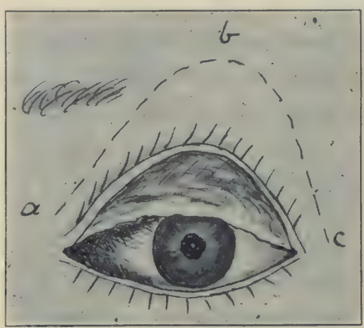

FIG. 2.

an incision is made obliquely upwards into the cicatricial skin and then continued in a curve downwards to a point (c) about 5 millimetres from the external canthus. This incision outlines a large flap (abc) which is carefully dissected up from

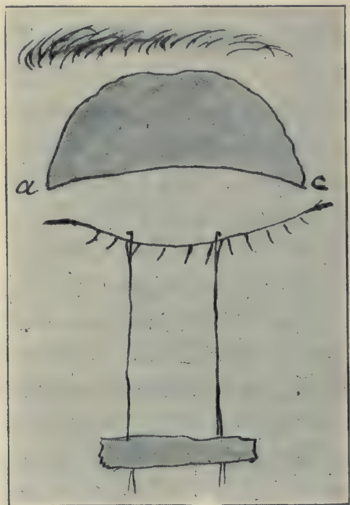

FIG. 3.

the underlying scar tissue as far as the lid border. The lid is then released by dissection from all cicatricial connections until it can be easily turned down into its normal position; and now the edge (Fig. 3 ac) of the lid flap is fastened by silk sutures to the upper border of the tarsus."

*Archives of Ophthalm. Vol. 25.

If, however, on account of the eyebrows the lid flap cannot be taken from the cicatricial skin, we make an incision along the lid border and after the reposition of the lid cut from the arm a Thiersch graft of suitable size which is transported on the razor directly to the lid, spread out over its surface and fastened by fine silk sutures to the upper tarsal border as well as to the wound edge of the free border. These sutures must be inserted with great care to make sure the edges of the flap do not roll in; their application therefore is very tedious work; but the time is well spent because the graft thus fixed is positively secured against being shifted from its place by any movement of the lid or by any accidental displacement of the dressing. After the

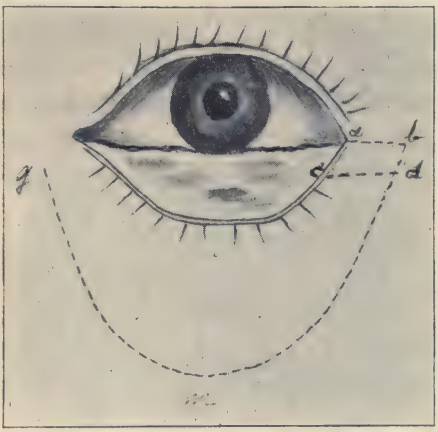

FIG. 4.

lid flap is fastened (as in Fig. 3) the lid is drawn down as far as possible and held in this position by two ligatures passed through the free border and fixed on the cheek by plaster strips. This is done for the purpose of immobilizing the lid during the healing process and also for enlarging the wound (a, b, c), above the lid to its fullest capacity. Over this wound a Thiersch graft is spread out so that its edges lap over the surrounding skin; no sutures are used.

TECHNIQUE OF THE OPERATION ON THE LOWER LID. Here the lid flap can always be procured from the cicatricial skin; but as this skin shrinks considerably as soon as it is dissected up we must take good care to cut the flap of very liberal dimensions. We begin the incision one centimetre below the inner canthus (Fig. 4g), carry it obliquely down into the cheek to a point (m)

2 to 3 centimetres below the centre of the everted lid margin; then we continue it in an oblique direction upwards and outwards to a point (b) even with and one centimetre from the outer canthus. This large flap (gmb) is then dissected up from the underlying scar tissue and all cicatricial strands and bands are cut until the lid is freed and can be turned up. The next step is to reduce the overstretched lid margin to its proper length by removing a suitable piece of the lid (except the conjunctiva) near the outer canthus by the following incisions: from the canthus (a) transversely to (b), from (a) to (c) along the lid margin, and from (c) to (d) through the flap; the edges (cd) and (ab) are then united by two silk sutures. Now the lid is drawn up as far as possible and held in this position by two silk ligatures passed through the free margin and fastened on the forehead by adhesive plaster or collodion. This done the edge of the lid flap is anchored to the tarso-orbital fascia by silk sutures (Fig. 5). The lid flap should be evenly

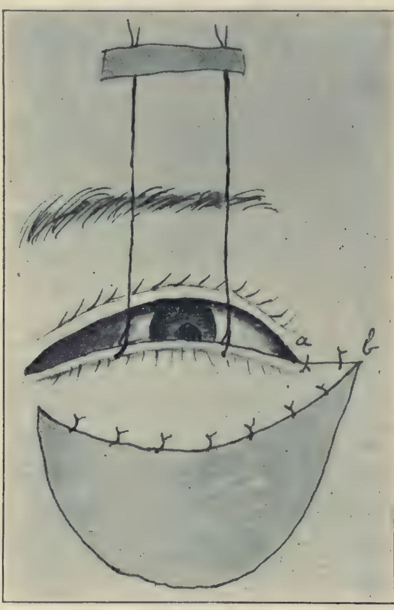

Fig. 5.

spread out, so as to be in perfect contact with the wound surface; but we must carefully avoid any undue stretching; and should we find that the flap is a trifle short and would be stretched if the sutures are placed very near the infraorbital margin, it is better to put them through the fascia 1 or 2 milli-

metres higher up. Finally the wound surface (gmb) below is covered with a Thiersch graft the edges of which are made to lap over the surrounding skin. No sutures.

THE AFTER TREATMENT is the same for the upper and lower lid. Strips of gutta percha protective are laid over the flaps, and upon these strips a gauze compress wrung out of warm boric acid solution; this is covered by a large, square piece of protective to prevent evaporation and over this is put a layer of cotton to maintain uniform warmth. This whole dressing is secured in place by a roller bandage and best left undisturbed for three days. Then it is carefully removed; the flaps are thoroughly cleansed, the overlapping edges of the large flap are trimmed off and a new dressing is put on which is changed every day or two as circumstances may require. At the end of the first week the ligatures and the sutures of the lid may be removed; during the second week some simple ointment (like borated vaseline) is applied daily on the flaps and after this period no further treatment is required.

DISCUSSION.

DR. CASEY WOOD.—I feel a debt of gratitude to Dr. Hotz for his suggestions in the surgery of the lid. The main thing in his experience of grafts is the selection of the skin. Dr. Hotz suggests that grafts be taken from the arm. If a Thiersch and not a Wolfe graft be employed, I endorse that statement. If the directions to use a Wolfe graft are followed, it must be remembered that the hair of our bodies is removed or its growth reduced to a minimum by the rubbing of our clothing. If one remove the thin and apparently hairless skin of the anterior aspect of the arm and transplant it to the face, it, no longer repressed by the friction of the clothing, will develop a magnificent growth of hair and the patient will be obliged to constantly pull them out. . This was exemplified in a case operated on by the speaker for the restoration of the lower cul-de-sac. It is now hoped that the artificial eye, the patient will soon wear, will keep the hair down. In another case where an angioma the size of a butternut was exercised from the lower lid of a child 2 years old, the skin removed at that time involved the whole length of the lower lid, and to replace it a Wolfe graft was used. It took nicely, but now there is a large, white, thick patch, resulting from the transplantation, to deal with, however successful it has

been and however useful it is. The speaker in nearly all cases discards the Wolfe graft and advises the Thiersch, which answers all requirements and avoids the inelegant appearance following the thicker grafts from whatever part of the body they are taken.

Dr. Oscar Dodd, Chicago.—I was very much pleased to hear this paper by Dr. Hotz, and especially the suggestions as to the anchorage of the grafts of the lower lid to prevent retraction. In the upper lid I have never had any trouble in using Thiersch grafts, and that is the only form I use in that region, unless the whole thickness of the lid, with the conjunctiva, is removed with the tumor. In the lower lid I am not always able to get tissue of the size that can be transplanted. In two of my cases the burn was so deep, there was nothing but dense cicatricial tissue adherent to the periosteum, and all I could do was to bring tissue from outside to form the lid. Thiersch grafts I have found useless in these cases. Perhaps by anchoring, the method Dr. Hotz describes, I may be able to obviate the difficulty. The Wolfe graft, if prepared very thin, I have found of benefit, but it has the disadvantage that it is never like the skin of the face or lid, and will remain—at least, for years—of a different color and can be distinctly seen. As for pedicle grafts from the temple and cheek, I do not feel as Dr. Hotz has stated, that they should never be used. I think there are cases where it is impossible to get as good results as we wish in the restoration of the lids without them.

Dr. Geo. F. Suker, Chicago.—Dr. Hotz's operation is certainly admirable. He laid emphasis on the contraction of the flaps not taking place, which is the all important factor. It occurred to me, however, that if he did not have the exact coaptation by not having the upper flap overlap the lower, but left a narrow line of granulating surface between the flaps, he would avoid all depression or contraction. I agree as to the Thiersch graft. I had a disagreeable experience not long ago in transplanting a Wolfe graft, as now the patient has to shave his lid.

Dr. Derrick T. Vail, Cincinnati.—This is a subject which appeals to us all. We have seen the various forms of ectropium due to cicatricial changes following burns and neoplasms about the eyelids. The ingenious method of Dr. Hotz certainly will

cover many of the cases we have to treat. I wish to compliment him on his ingenuity and originality in devising the double flap and wish to inquire if it is original.

Dr. Hotz.—So far as I know.

Dr. Vail.—It is a valuable contribution to the art of plastic surgery of the eyelids and I think will prove to be of great help in the surgical treatment of cicatricial ectropium. I have never used it, but have used his old operation for ectropium with fairly satisfactory results.

There is one kind of ectropium of which I have seen two cases within eighteen months, where his double flap operation would not, perhaps, be applicable. I refer to that form of ectropium which involves the inner canthus of both eyes; where the skin of the nose has been burned off, followed by cicatricial contraction and the inner canthus of each eye is drawn so badly toward the median line of the nose that there is only a small space between them on the bridge of the nose. This generally concerns both eyes. I met this condition with the suggestions laid down by Dr. Hotz in his former operation. I restored the lids to the eyeball and also restored the patulency of the lachrymal ducts, laying in a nice transplanted flap, but the operation was a failure. The cause of the failure I learned by the experience afforded by the operation. In restoring the lids to the eyeball at the inner canthus, you have a crescentic exposure of the fascia, and it would seem that a piece of skin laid in there would give satisfactory results, but it will not. To have a good result it is necessary to anchor the upper lid to the lower lid at the inner corner of the eye in such a way that you really have an involution of the canaliculi and puncta to allow for contraction changes. The main thing about the whole operation for cicatricial ectropium in general is in following the suggestion Dr. Hotz has made about *taking up the slack of the lid* and unless you take away fully a third of the lower lid at the outer canthus your operation will be a failure.

Dr. Albert E. Bulson, Jr., Fort Wayne, Indiana.—It is my experience that the annoyance from the presence of hairs in the skin grafts, already mentioned, may in a very large measure be overcome by taking the grafts from behind the ear where the epithelium contains fewer hair follicles. These grafts prove more satisfactory than grafts taken from any other part of the

body, but it is not always possible to secure grafts of sufficient size to cover large surfaces and then resort must be had to epithelium from some other part. In the majority of operations around the eye, grafts of sufficient size, taken from behind the ear, can usually be obtained.

Dr. J. M. Ray, Louisville, Ky.—I presume all the members of this Association listen with interest to what Dr. Hotz may say about the plastic surgery of the eye and eyelid. I have done a certain amount of this work myself and I find it a great advantage, when I transplant flaps, to first bare the edges of the lids and sew them together. I did this in one case with a large Wolfe flap, a very small portion of the flap grew, but by having the eyelids sewed together, I later transplated Thiersch grafts and eventually covered the surface. I then separated the lids and a good result followed.

Dr. Hotz (closing discussion).—I was glad to hear Dr. Wood's observations. Whether I am correct or not, I emphasize the careful selection of the proper materials. (Dr. Hotz showed photographs of cases operated on by other methods with unsatisfactory results.) Cut Thiersch grafts as thin as possible—just the epidermis—just deep enough to get live cells and not hair follicles. Do not transplant hair follicles and you will not have hairs in the flaps. If in the lower lid cicatricial tissue is not available, I would use Thiersch grafts. I have done the operation a number of times, otherwise I would not present it to you. I could show you in Chicago a number of cases. The upper lid moves nicely and shows the deep characteristic furrow. Dr Suker seems to have misunderstood what I said in regard to allowing the upper flap to overlap. This is done to prevent the rolling in of the flaps, as Thiersch flaps have a tendency to roll in. So fastened, they will not do it. In changing the bandage, the overlapping portion is simply pared off. I forgot to mention that. To leave a granulation line along here would have no advantage. If we fasten the flap firmly to the tarsus we know it will unite. If we leave it to granulations, we trust to uncertainties.

(Just at this time a patient, whom Dr. Hotz had formerly operated on, chanced to call, and thus the Doctor was afforded an opportunity to present the case for inspection to the Academy and to show the perfect cosmetic result obtained by his operation).

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ORIGINAL ARTICLES.

EXSECTION OF THE SO-CALLED TARSAL CARTILAGE IN CASES OF CHRONIC TRACHOMA.*

By CASEY A. WOOD, M.D.
CHICAGO.

Illustrated with 8 Cuts.

SOME five years ago† I reported the results of the so-called Heisrath's operation in fourteen cases of chronic trachoma. As my subsequent experience has been equally and uniformly satisfactory, I am encouraged to bring the subject once more to the notice of the profession through this Association, particularly as I do not believe it has received the attention it deserves.

Let me repeat that this procedure is not, in my opinion, indicated in any of the recent or acute forms of trachoma nor would I advise it in any case where there is a reasonable prospect of early cure—not temporary relief merely—from any other form of treatment. When other remedies have failed and there is nothing before the patient but months or years of suffering—nothing but the "ups and downs" that characterize a deepseated trachoma, with its visual dangers and bodily discomforts from pannus, corneal ulcer, trichiasis and entropion, not to mention long continued and serious interruption of work—in many of such cases tarsal excision is

*Read before The Academy of Ophthalmology and Laryngology at Indianapolis, Ind., April 9, 1903.

†Removal of the Tarsus and Retrotarsal folds in certain cases of chronic Trachoma. *Annals of Ophthalmology*, 1898. p. 372.

certainly indicated. On the other hand, in the most advanced stage of the disease, in those cicatricial forms that have gone on to shrinking of the sac and in which there are probably few or no active trachomatous nodules in the tarsal cartilage, I do not think the operation is justifiable. Nor should it be resorted to if it is possible, as Gifford points out that it sometimes is, to remove, one by one, the discrete and scattered trachoma nodules from the tarsus itself.

Let me further declare myself in this important particular by more positive statements. Removal of the tarsus, in part or as a whole, is indicated in those long standing cases of trachoma, not amenable to other forms of treatment, in which the lids show trachomatous infiltration, with granulation deposits in the connective tissue of the retrotarsal folds, whether the cornea be affected or not. If to these conditions be added thickening and enlargement of the tarsus itself, the operation is even more urgently indicated. Also, when there is evident disease of the folds, without apparent thickening of the cartilage, but the cornea is implicated, the operation should be done. A very important class of cases, from an operative standpoint, is that where with atrophy or cure of previously existing granulations in the tarsal folds there remain deepseated foci in the tarsus. In this troublesome and inveterate form of trachoma, whether the cornea has escaped or not, removal of the tarsus will give gratifying results.

The palpebral conjunctiva is rarely the only site of granular deposits in long standing cases of the disease. It is quite exceptional that the tarsus and submucous connective tissue escape. I believe that I am correct, therefore, in asserting that the simple method of excising the retrotarsal folds (long ago advocated by Richet and Galezowski) does not meet the requirements in such cases. The proposition is practically to remove the neoplasms that, in the later stages of this infection, are responsible for the destructive lesions of the disease. Why, then, should we remove a portion of these semi-malignant tumors and allow the others to remain? As long as there is reasonable ground for assuming that the activity of the trachoma colonies is confined to the conjunctiva and submucosa such procedures as *grattage*, the use of forceps, cauterization, excision of portions of diseased membrane, etc., are

of course, proper, and the method that I am about to describe is not intended for their relief.

Although it is desirable that the eye should be as quiet as possible before operation, I have not hesitated to excise the tarsus either in the presence of corneal ulcer, increasing pannus or during an acute exacerbation of the chronic disease. I have been satisfied with the results in these instances but have been careful to remove the stitches at as early a date as possible and to keep up constant disinfection of the eye while they are *in situ*.

A better understanding of the effects of the operation is gained by a reference to the muscular supply of the lids. According to Thomas Dwight and others the superior rectus,

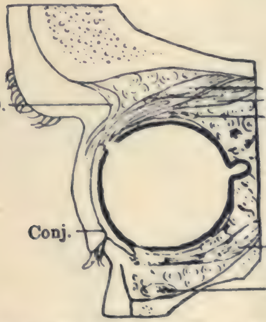

Fig. 1—(Dwight). Showing the relations of the orbital faschia to the tendons of the levator palpebræ, the superior rectus and the tarsus.

besides its insertion into the globe sends fibres not only to the top of the fold of conjunctiva, which is thus pulled up and back in harmony with the upward excursion of the eye but also to the top of the tarsus. Moreover "the levator broadens out into an expansion stretching across the whole orbit from one bony wall to the other, which, by its outer portion separates the greater lachrymal gland from the accessory portion below it. This expansion splits into two layers. The greater portion, consisting of involuntary muscular fibres, (Mueller's muscle), is inserted into the upper portion of the tarsus, while certain anterior fibres pass into or through the fibres of the orbicilaris to the skin of the lid. Their function is to draw the skin to the fold above the tarsus when the lids are opened. The expansion of the levator passing to the tarsus consists largely of

unstriped muscular fibres mingled with elastic tissue. This is connected with other involuntary fibres arranged transversely, the whole constituting what is known as "Mueller's muscle."* A somewhat similar arrangement exists in the lower lid, the tendinous expansion of the inferior rectus dividing into three layers, one of which is attached to the tarsus and taking the place of the levator of the upper lid in drawing the lid down in downward rotations of the globe and in opening the eye.

All the German authorities consider cocain a sufficient anesthetic for the operation. Kuhnt instills a 4 to 10 per cent. solution as a preliminary and then makes two or three subconjunctival injections of a 6 to 10 per cent. solution. I

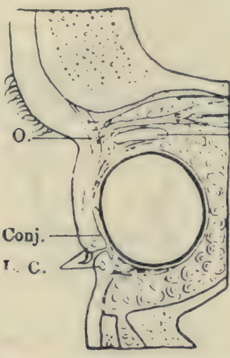

FIG. 2—From Dwight, showing the relations of the orbital faschia to the upper lid.

have not found this very satisfactory with my patients and I now invariably insist upon a general anesthetic. Not only is the operation a painful one (particularly when more than one lid is involved) but its success largely depends upon precision in placing the sutures and in other details difficult to carry out if the patient be restless or nervous.

The diagrams, from Kuhnt's work, illustrate the various steps of the operation, which I shall now proceed to describe.

When the operation is done, as it usually is, on the upper lid, the latter is everted so that the convex border of the tarsus is thoroughly exposed. This is now firmly grasped by two strong, toothed forceps at the junction of the middle

*Norris and Oliver. System of Diseases of the Eye. 1. 91. 92.

with the outer and inner thirds of the tarsal margin, and drawn firmly upward by the assistant standing at the patient's head. The junction of the palpebral and ocular conjunctivæ

EXCISION OF THE TARSUS.
FIG. 3—First act. Eversion of the upper lid with forceps (Kuhnt).

is now fully exposed and may be readily examined. Following as nearly as possible the margin of the diseased area, an incision is made from the outer to the inner canthus through

FIG. 4—Second act. Complete eversion of the upper lid and exposure of the retrotarsal folds. First incision along the dotted lines (Kuhnt).

the conjunctiva only. Unless, in consequence of previous mechanical treatment, the conjunctiva is bound down to the underlying tissues, the wound will gape and the fibres of Mueller's muscle may be recognized. Three stitches should

now be passed through the bulbar margin of the incision, care being taken to include only the conjunctiva and a few fibres of the submucosa. If more than a mm. in width of conjunctiva is included in the sutures, small symblepharon folds may form opposite each stitch, and if too deeply inserted there will be a noticable dragging on the lid edges, as occurred in one of my own early attempts.

A word as to the sutures. My assistant, Dr. Frank Brawley, has prepared for me a modification of the black silk (preferably No. 2 black braided) which Worth advises in his advancement operations. I have used them for the past year with great satisfaction in all operations that involve the con-

FIG. 5—Third act. Second incision near the lid margin, after placing of the sutures in the upper border of the first wound (Kuhnt).

junctiva and I warmly advocate their employment in the procedure about to be described. The silk is first wound upon ordinary glass microscopic slides (for convenience of handling) and sterilized by boiling 30 minutes. It is then dehydrated by immersion in absolute alcohol for 10 minutes and the drying process assisted by holding the slides a few feet above a Bunsen burner flame for a few additional minutes. The slides of silk are then dropped into a jar of paraffin containing 25 per cent. of vaseline, where they remain until used. Each time they are used the jar containing the silk is resterilized by heating, an end of suture is drawn out of the jar and the excess of wax is "stripped" off the required suture lengths by drawing it through sterile gauze held between

the thumb and finger. The threads are now somewhat stiff yet flexible, are easily threaded, never "kink" and slip through the tissues with the minimum amount of friction and traumatism and do not readily tear out of the tissues in which they are placed. Moreover, knots made in these threads are much less likely to irritate and abrade the cornea or bulbar conjunctiva. Once introduced through the lower wound margin they should be allowed to hang down over the globe (see the diagram) and to rest on a sterilized towel placed on the cheek. After the sutures have been thus placed the bulbar conjunctiva should be separated from the globe a distance

FIG. 6—Fourth act. Bringing the edge of the wound together after tarsal excision. Estimating the proper place to enter the needles below. Forceps used in operation (Kuhnt).

of 3 to 5 mm. from the edge of the wound. The forceps may now be removed from the convex border of the tarsus and the lid margin be grasped at its middle point, a horn spatula being passed behind the everted lid, as shown in the diagram. A second incision, running the whole length of and parallel to the lid edge, is now made as nearly as possible in the healthy conjunctiva. Sometimes this will be three, sometimes even five mm. from the palpebral border, the intention being to remove as little of the unaffected mucuos membrane as possible and so to leave as large a portion of the central conjunctiva area as is consistent with the needs of the case. The spatula may now be removed, the assistant drawing the lid upward and backward with one or two fixation forceps. The operator then seizes the tissues at the nasal junction of

the two incisions and with scalpel and scissors slowly excises conjunctiva and tarsus, carefully avoiding the orbicularis and Mueller's muscle. At this point the anesthetic may be removed, and time allowed for the bleeding to cease. I have

Fig. 7—First act in the operation for removal of the tarsus without sacrifice of a fairly healthy conjunctiva (Kuhnt].

not been much troubled with hemorrhage, although some small branches of the arterial supply may have to be twisted.

The conjunctival sac should be thoroughly irrigated and the lips of the wound brought together. To secure asatisfactory result one must be particular to place each suture in

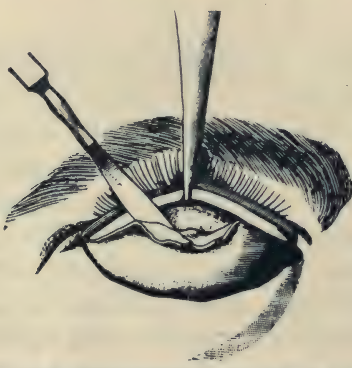

FIG. 8—Second act in the subconjunctival excision of the tarsus (Kuhnt).

both wound margins so that it will be exactly oppose its fellow when the eye is closed. It is also requisite that the bulbar conjunctiva should not be too much put upon the stretch. The middle suture should first of all be tied with a single knot and it is wise to make certain, by closing the lid, to ascertain whether the precantion just mentioned has been taken

before the final knot is tied. I would advise the operator to allow the patient to recover from the anesthetic sufficiently to enable him to determine accurately whether the palpebral movements are sufficient and to be sure that there is no irregularity visible at the lid margins. If the interpalpebral space is the same, both with the eye open and shut as it is on the opposite side, and if the lid margins have a regular outline, all is well and the threads may be cut off close to the knots.

As a rule there is little subsequent pain, and very little reaction. The *after treatment* is simple and need not interfere with the attention properly demanded by the presence of corneal ulcer or other complications. On the whole I find gentle irrigation of the sac four or five times daily with warm boric acid solution, followed by the instillation of warmed and steril vaseline, is grateful to the patient and acts very nicely. The vaseline keeps the sutures soft and serves to protect the cornea. I apply a light bandage over both eyes and order the patient to keep quiet, but do not insist upon his remaining in bed. The sutures are removed on the fourth or fifth day. In a week or ten days the wound is usually quite healed but the sac should be subsequently examined for the presence of granulation tissue or irregular wound margins. These are best clipped off or trimmed with scissors.

It is advised by some operators that no stitches be used, owing to the possibility of corneal lesions. For my own part I have not witnessed these untoward results when the precautions I have mentioned have been taken, and I am sure that healing occurs sooner and the cosmetic effect is better when sutures are employed.

I do not see a great many cases of chronic trachoma, either in my private practice or in my dispensary work, and I have operated on only eight additional cases since my last report, but these have been so satisfactory to me that I take the liberty of reporting several of them here, choosing those instances that seem to me to illustrate the majority of the conditions in which, in my opinion, the operation should be done.

The most important result of this operation is the relief given to the irritative symptoms of the disease. Very shortly after the removal of the stitches we notice the subsidence of

the photophobia, the lachrymation, the foreign body sensations and the local discomfort that accompany chronic granular lids, even when there is no ulceration of the cornea or no acute conjunctivitis present. Pannus is always lessened and may even disappear, and as a direct consequence of this the sight is much improved. In one very severe case of corneal infiltration, referred to in my previous communication, where the visual acuity had fallen to $^1/_{10}$ it rose to $^2/_7$ within three months after the tarsal excision. The asthenopia generally exhibited in the better eye of a case of chronic unlateral trachoma is wonderfully improved, and, strange to say, in not a few cases those common sequels of chronic trachoma, entropion and trichiasis, are decidedly less marked than before the operation. Finally, when we have to deal with recurrent ulcer of the cornea, a cure of the abnormal conditions behind it generally prevents a return of the disease.

The objections that have so far been urged to the removal of the tarsus are:

(1) That *ptosis* is likely to follow the operation owing to section or exsection of the levator palpebral superioris. I have never seen a single instance of this sequel in the twenty-two cases in which I have myself operated on nor in patients under the care of others. Owing to the relief from spasm of the orbicularis palpebrarum (always more or less present in all forms of chronic trachoma) the patient invariably opens his eyes to a greater extent than before, and I have not witnessed and do not expect, as the result of the removal of the tarsus, any diminution in the size of the interpalpebral fissure or in the power of the levator muscle. I believe the reason is that the attachment of the muscle is not to the tarsus alone.

(2) The same denial I would like to enter as to the probability of *entrcpion*. The fact that a shrinking and diseased tarsal cartilage is one factor in the production of lid edge incurvation accounts for the fact, sufficiently noticed by Kuhnt and seen in several of my own cases, that after the operation the previously incurving cilia gave no further trouble. In one instance, referred to in my first paper on the subject, and in another more recent one where epilation had been practiced for long periods, the eyelashes no longer required to be removed.

(3) *Ulcer of the cornea* has been noted after this operation, and it seems reasonable that the rubbing of the stitches and knots over the eyeball might produce an abrasion followed by infection. I have never had such an experience and do not think that if the directions for the operation, especially with the use of specially prepared sutures are followed, it is not likely to happen. Moreover, when one remembers that serious corneal ulcer may occur at any moment in these very cases, with or without treatment, it seems hardly proper to lay this accident at the door of the operation.

(4) The one complication to be avoided in Heisrath's procedure is the production of irregular, symblepharon-like folds in the region of the sulci. Unlike the alleged dangers just discussed, which are more imaginary than real, this is an accident which *may* happen to the careless operator. When it does occur it is very annoying to the patient, inasmuch as the ocular excursions are attended by dragging, drawing sensations, and in nervous subjects are exceedingly irritating. For relief of them it is best to dissect back the symblepharal attachments and implant mucous membrane or skin grafts to cover the denuded surface.

The following cases may serve to further illustrate the contentions of this paper:

Case 1.—Sister V.'s eyes were infected from a patient in a St. Louis hospital in 1893. She was treated during the following year by Dr. Alt and when I saw her, two years after, the disease had assumed the usual chronic form of the follicular type; the granulations were not exuberant, but corneal complications were frequent. The patient was unable to use her eyes and suffered much from foreign body sensations, headache and photophobia. She had numerous small nebulæ corneæ and a superior pannus on both sides. She came to me chiefly on account of pin-point ulcerations on the left cornea. I treated her with varying success by all sorts of methods and remedies for nearly a year. She had many relapses in the meantime and her visual power slowly declined. Finally, in December, 1897, I persuaded her to have both tarsi removed from the upper lid. This was done and the patient slowly recovered. To-day she has, with correction of her myopic astigmatism, $^{2}/_{7}$ vision in the left eye and a little better in the

right eye. She reads words of Jaeger 1 with the right eye and of Jaeger 4 in the left. More important, her eyes are quite comfortable since the spring of 1898, when she had one corneal ulcer due, probably, to a number of infected follicles, which were not removed at the time of the operation and which I treated subsequently with lapis divinus.

CASE 2.—Mr. A. N. was attacked by inflammation of the lids in 1882 and until comparatively recently has been under treatment in France and in this country. I saw him in May, 1897, and found him suffering with well marked chronic trachoma in both lids, pannus in both eyes, a beginning staphyloma left (for which Galezowski had done an iridectomy), there were granulation masses in the left upper and lower folds, upon which I used the forceps. Then began a long, weary attempt to get rid of the disease. The patient was treated all summer. When I saw him in September, 1897, the secretion and granules were less, but he had had several pin-point ulcers in both eyes and was much discouraged. I did a Heisrath's operation on the left or better eye ($V = {}^7/_{200}$) and later on the R. The right lens becoming cataractous and the corneal staphyloma increasing, I removed the lens, with improvement. He began to get better and to-day is practically cured of his trachoma, but bears the scars of the contest. In left eye V with correction of $A = {}^{20}/_{70}$—and words of Jaeger 4 at 10 cm.

CASE 3.—Oct. 21. Celia H., school teacher, had to relinquish her occupation on account of a chronic eye inflammation which affected both eyes in 1897. In September, 1900, I saw her, when she had a well developed follicular trachoma, affecting both lids of both eyes. V. R. = fingers at 1 meter: $V.L. = {}^{20}/_{30}$—. There was total pannus R., by far the worse eye. Treatment was followed by improvement left but very little R. Heisrath's operation done R: many granulations found in the wound, but all lid movements good. Treatment with lapis after use of forceps in the left affected a cure. Patient returned a few weeks ago to say she had resumed school six months after the operation perfectly well. With correction $V.L. = {}^{20}/_{20}$. $V.R. = {}^{20}/_{70}$. There are nebulae plainly to be seen on R. cornea but the operation scar is insignificant and there are no symblepharal folds.

CASE 4.—Maggie Driver, age 27, Versailles, Mo. Has had trachoma in both eyes for 12 years, with repeated exacerbations, corneal ulcers, pannus, etc. Father, mother and 11 brothers and sisters had disease. First saw her Nov. 7, 1902, when she had an acute attack of trachoma beginning four weeks previous. A well marked pannus present with some staining of left cornea with fluorescein. Right eye not so bad. Trichiasis both eyes. Right lower lid has been operated upon for entropion. Marked improvement under 20 per cent. argyrol used three times a week in office and a 5 per cent. sol. three times a day at home. Cold applications every 2 hours followed by boric acid lotion.

Jan. 7-8, 1903. Tarsus of R. eye removed.

Jan. 7-15. Tarsus L. eye removed.

Made an uneventful recovery.

LV. $^{5}/_{200}$. RV. $^{11}/_{200}$.

The excision of a part or the whole of the so-called tarsal cartilage, without sacrificing the overlying conjunctiva, is an operation suggested by Kuhnt in those cases where the disease has practically died out in the mucuos membrane but is active in the submucuosa and tarsus. I have had no experience of the method, although the *technique* presents no difficulties and the operation seems rational.

DISCUSSION.

DR. OSCAR DODD, Chicago.—What effect has this on the cul-de-sac? Perhaps I did not hear the paper as distinctly as I should, but I did not get the exact explanation as to that part.

DR. ALBERT E. BULSON, JR., Fort Wayne, Indiana.—I have been much pleased with this paper for the reason that it advocates an operation which will certainly give relief to a large number of cases suffering from the ill-effects of a thickened and inverted eyelid following trachomatous inflammation.

I wish to digress a little by reporting a case operated in a similar way to that described by the essayist. After repeated failures to secure satisfactory results in an aggravated case of entropion (the Hotz operation and several other measures being resorted to), I conceived the idea of removing a portion of the thickened cartilage which I thought in a very large measure responsible for the continued irritation of the eyeballs and prac-

tical loss of vision in both eyes from pannus. The operation was decided upon as being a measure that would produce no harm if it did not produce relief, for there was everything to gain and but little to lose in the treatment of the case. Under a general anaesthetic the conjunctiva was dissected up, and practically the entire tarsal cartilage removed, only a small part of the upper portion being allowed to remain on the theory that it might act somewhat as a support for the remaining tissues. The case went on to recovery, and I had the satisfaction of seeing the pannus clear up to a certain extent and vision improved so that the patient could see to get about without assistance, whereas before, his vision was so poor that but little more than shadows were seen. Some ptosis remained, but this was not sufficient to prevent vision, and the patient was so thoroughly satisfied with the results that he made no complaint regarding the slight drooping of the lid.

I am convinced that the operation is beneficial in a certain class of cases, but think it should be reserved for those obstinate conditions in which inversion of the lids continues in spite of all other treatment usually employed.

Dr. Adolf Alt, St. Louis, Mo.—I would like to ask what effect the removal of the tarsus has on the remaining granulating tissue. This operation leaves a strip of conjunctiva along the upper edge of the tarsus and there is undoubtedly some trachoma in the tarsal fold, although there was not in the pictures. Is there no further growth of the trachoma? I have never seen a case yet in which I felt obliged to resort to this operation. It seems to me Dr. Prince read a paper on the same subject at our meeting some five or six years ago in Chicago. If it is of so much benefit we will have to adopt it as a legitimate measure.

J. B. Worrell, M. D., Terre Haute.—I never had occasion to make the operation. I remember some years ago having seen a case in which the tarsus had been excised but do not know the technique in the case. Last year I saw a very unfortunate case in which the operation had been done and the patient had no lid left. Whether it was for the removal of trachomatous tissue or not, I cannot say. The problem was to restore the lid, and to a certain extent it was accomplished. I rise to ask two or three questions; in the operation, do you remove all the tissue between

the two incisions, afterwards stitching the two edges together? (DR. WOOD.—Yes, where possible.) What is the effect of this upon the cul-de-sac? Would it reduce that to such an extent that it would limit the movements of the eyeball? Do you remove the tarsus entirely, leaving only the muscular tissue of the lid? (DR. WOOD.—Every bit of it.)

DR. CASEY WOOD (closing discussion).—The main question in cases of inveterate trachoma is, shall we go on treating them by the usual ineffective method, or try to eradicate the foci of the disease itself? So far as the formation of tears is concerned, the removal of the tarsus has not made any difference at all. In a few cases there was a complaint of "dry eye;" and one may easily believe that in removing a large amount of conjunctiva a considerable secreting area disappears; but it must be remembered that xerosis is frequently present in old cicatricial trachoma so that we may usually refer these dry sensations to the ravages of the disease. Except in one case, the author has never noticed any limitation of the upward or downward excursions of the eyeball. In simple excision of the folds of transmission for this disease, an operation often done and described by French authors and those of the German school, no mention whatever is made of subsequent limitation of the globular movements. Would it be an insuperable objection to the operation, even if it did limit these rotations? External examination rarely shows that an operation has been done. In the majority of instances it is only when one attempts to evert the lids or to examine the condition of the folds that the absence of the tarsus can be noted at all.

The effect of tarsal excision on the remaining conjunctival tissue is very slight. However, the trachomatous tissue that remains can always be reached by remedies and I have not found any difficulty in so treating it, because it is superficial and can be reached by ordinary methods. But the nodules that are imbedded in or attached to the tarsus cannot be reached by mild means, and that is the reason for the operation. Our interest is to get rid of these active foci of the disease, which lie deep in the tarsus itself.

PARALYSIS AND PARESIS OF THE MUSCLE OF AÇCOMMODATION.*

By GEORGE F. SUKER, M.D.,

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IT is the endeavor in this paper to consider the paresis and paralysis of the muscle of accommodation as distinct and separate pathologic entity; and, to lay before the members sufficient valuable associated data so that our attention might more often be attracted to this particular lesion than has hitherto been our custom. Furthermore, it is intended to confine the consideration mainly to the so-called peripheral type. Topographical anatomy and physiological experiments warrant us to assume that the function of accommodation is an independent one with reference to the other functionings of the eye as such (Hess, 1902; Mauthner, 1899; Hensen and Voelckers, 1878). This does not make it necessary to exclude the so-called con-commitant associated acts of the iris and extraocular muscles.

The first correct conception or description of either paralysis or paresis, was given by Wells[1] (1811). He also knew full well the action of mydriatics on the power of accommodation. He did not, however, know of the various nerve centres concerned in the function of accommodation or pupillary reactions. This remained to be deciphered by Helmholtz[3] (1853), Bruecke[2] (1846), Huebner (1872), Mannhardt[4] (1858), Hensen[5] and Voelckers (1868).

Prior to these days, paresis and paralysis of accommodation were often confounded with rapidly oncoming presby-

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*Read before The Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 9, 1903.

[1]Wells, P. Philos. Trans., cl., p. 378, London, 1811. (See Donders Accom. and Refraction, foot note p. 597).

[2]Bruecke, E. Ueber den Musculus Cramptonianus u. d. Spannmuskel der Chorioidea; Mueller's Archiv., 1846.

[3]Helmholtz, H. Ueber d. Accommodation d. Auges; Archiv. f. Ophthal. (Graefe), 1855, 1. 2.

[4]Mannhardt. Bemerkungen ueber d. Accommodationsmuskel u. ueber die Accommodation; Arch. f. Ophthal., iv, 1858.

[5]Hensen and Voelckers. Experimentaluntersuchung u. d. Mechanismus der Accommodation; Kiel, 1868.

opia (Himly[6]). Before the days of cerebral localizations and the physiology of presbyopia, it was not at all surprising to make this error, as in both conditions the near point recedes, and the far point remains about the same as before. Not only was it confounded with presbyopia but with many of the present day amblyopias and amauroses (Nagel, 1866 and Donders, 1866, mention this fact in a foot note). A dilated pupil is frequently a pertinent objective symptom in paresis and paralysis and at the same time accompanies many of the amauroses. It was, therefore, not at all strange for the older writers to often confound the two conditions. Especially as we now know paresis and paralysis of the muscle of accommodation is not such a clinical rarity.

From Himly's time (1811) down to Donders (1864) very little was said about these conditions of the ciliary muscle. In 1860, Donders[7] gave the first accurate description of this ciliary affection as a sequel of diphtheria faucium (from an epidemic then in Paris). Since then, it has received more or less attention, but it was always associated with diphtheria and what is now called ophthalmopegia interna.

Not knowing that the centre of accommodation is one independent of the other eye centres, they never looked for paralysis or paresis as occurring unassociated with other intra- or extra-ocular paralysis. That they did not recognize this condition of the accommodation in ophthalmoplegia totalis, is evident from the writings of a certain Brunner[8].

Though the muscular mechanism of accommodation had long been known (Brücke, 1846; Helmholtz, 1855), and some of its errors recognized, yet they failed to locate the lesions and centres. Neither did they interpret the occurrence of the lesions correctly. The condition was not even

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[6]Paresis and par. of accom. at this period was called "ciliary amaurosis" (Walther, Jour. von Graefe and Walther, Bd. 111, 22; "amblyopie presbytique" (Sichel Annal. d'Oculist. 1853).

[7]Donders. Paralytische Sympt. nach Diphtheria faucium; Archiv. f. d. holland. Beitrage z. Nat. u. Heilk., 1860, Bd. 11, 453. (note) Faure in the L'Union Med. 1857, mentions diph. par. in six cases and says that Trousseau, Bretonneau and Blache also observed it. Prior to this time, it was called "amblyopia" (Guimer, 1838; Ozanam, 1835).

[8]Brunner, C. De paralysi musculorum oculi nonnulla (Berolini, 1850, p. 10. He first used the term Ophthalmoplegia Totalis, but he does not speak of any condition wherein accommodation alone was affected and the other muscles intact.

fully appreciated as late as 1878, as is evidenced by Hutchinson[9]. In an article of Ophthalmoplegia Interna, he prematurely places the lesion in the ciliary ganglion. To-day, we know that this ganglion has very little to do with accommodation whatsoever as a separate centre. The researches of Hensen and Voelckers have shown beyond a cavil that Hutchinson's assumptions were erroneous. Hutchinson evidently was not aware of the experiments of Hensen and Voelckers[10] (1878), Hulke and Schweigger[11] (1858).

At the present time, we accept the facts regarding the centers of the accommodation and pupillary reaction as laid down by Huebner, 1872; Voelckers and Hensen,[12] 1878; Kahler and Pick[13], 1881. These have demonstrated a series of centers in the nucleus of the third nerve, which are associated with different functions. These centers lie partly in the posterior part of the third ventricle and partly beneath the corpora quadrigemmina, in the floor of the aqueduct of Sylvius. They lie directly behind one another. That portion of the nucleus of the third, in the posterior extremity of the floor of the third ventricle just in front of the opening of the aqueduct, causes ciliary muscle contraction; a little farther back in the aqueduct is the iris contraction centre; the centre for the external ocular muscles is the next. From this arrangement, it can be said that in the loss of their functioning, we have:

(a). Loss of the power of accommodation.

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[9]Hutchinson. "Ophthalmoplegia Interna;" read before the Roy. Med. and Chir. Soc., 1878. H. was the first to clinically speak of the terms "ophth. interna and externa." Graefe in 1868 uses the same term in speaking of analogous conditions. Eulenburg, 1871, speaking of similar affections of the third nerve appropriately applies the term "progressive" (very fitting for nuclear paralyses).

[10]Hensen and Voelckers. Vide general references, No. 2.

[11]Schweigger and Hulke in 1858 demonstrated ganglion cells in the front of the choroid and ciliary region and associated them with the action of the iris. Graefe-Saemisch Handb. d. gesammt. Augenheilk., vol. 1. 1858.

[12]Hensen and Voelckers' (v. gen. ref.) arrangement: 1, Accommodation. 2, Sphincter iridis. 3, Rectus internus. 4, Rectus superior. 5, Levator pal. 6, Rectus inf. 7, Oblique inf. 8, Trochlearis.

[13]Kahler and Pick's arrangement (Prager. Ztschr. für Heilk. Bd. 11, 4, pp 301): 1, Accommodation. 2, Iris. Medial: 3, Rect. sup.; 4, Rect. ext. Lateral: 5, Levator pal.; 6, Rect. sup.; 7, Oblique inf. 8, Trochlearis.

Experiments on cats, dogs and monkeys have verified this classification.

(b). Loss of the pupil contractions.

(c). Paralysis of the muscles supplied by the third nerve. Often the fourth and sixth are involved because their centres are contiguous to the third. However, an association of "a" and "b" constitutes an ophthalmoplegia interna. This ophthalmoplegia can be complete or incomplete, especially if we incline to Mauthner's view of the nuclei.[14]

Furthermore, the blood supply (Huebner[15], 1872; d'Astros and Alezias[16], 1892) to these intrinsic centres, as laid down by these experimenters, will add material weight that one of these centres for the various functions of the third nerve can be affected without implicating the other two, in any shape, form, or manner. You can have a paralysis or a paresis of the extra-ocular or intra-ocular muscles, separately or combined; or, only one muscle in either group. But, it may be asked why it is that the iris and ciliary centres are more often involved than the others. No satisfactory reason can be assigned for this.

According to the foregoing, Hutchinson's theory that the ciliary ganglion is the nucleus for ophthalmoplegia, is evidently untenable. The ganglion would have to be divided in a manner like the third nucleus and this we know is not so.

[14]Mauthner. Ich bin auf Grund d. klin. Beobachtungen d. Ansicht dass d. Nerven f. d. Augenmuskulatur jedes Auges saemmtlich ihre Kerne auf d. gleichnamigen Seite haben u. d. daher d. einseitige totale Ophthalmoplegie einfach durch d. reihenweise Erkrankung d. gleichseitigen Nervenkerne bedingt wird. Die Lehre von den Augenmuskellæhmungen, 1889, S. 368.

[15]Huebner. Zur Topographie der Ernaehrungsgebiete der einzelnen Hirnarterien; Centrbl. f. d. med. Wissensch. 52, S. 818, 1872. H. clearly shows that the circulation of the brain cortex and the base are entirely different. In the former innumerable anastomoses occur with an extensive ramification; in the latter, the vessels after a short course dip into the substance of the brain and supply the immediate surrounding areas without anastomosing. In other words, we have typical end arteries in the basal circulation and not in the cortical. They are end arteries according to Cohnheim. Each supplies a distinct, though small brain area; and, the supply of the third nucleus is no exception. The vessel supplying the nuclei of the iris and the accommodation, is the ramus communicans posterior and does not supply any other part of the third nucleus.

[16]d'Astros and Alezias dispute Huebner and say the blood supply comes from the posterior cerebral of the basilar and not directly from the basilar. It is called the arteriæ nucleoli oculomotorii. (A Les artéres nourricières des noyaux du motaire oculaire commun et du pathétique; Soc. de Biol., Juni 1892).

Experiments uphold Hensen and Voelckers but not Hutchinson. Again, it is very reasonable to suppose that a ganglion of the sympathetic group and not of the cerebrospinal, in addition to being removed from the nerve centres, has more to do with "intimate association" of closely allied automatic functions than with their differentiation from one another (W. A. Sturge, V. vf). Spec. ref. No. 8.

It may be stated as a fact (experiments in the past and the present bear out the assertion) that upon the removal of the ciliary ganglion[17] and the stimulation of the cervical sympathetic[18], the pupil still dilates to a considerable extent. The reverse holds true also. Furthermore, the pupil dilates when both mentioned ganglia are excised, and atropine is instilled or a peripheral irritation made. When eserine is instilled under these conditions, the catoptric images change. These points show that the iris must be supplied with dilating fibres derived from a different source than from the ones already noted. These accessory fibres are furnished by the ramus ophthalmicus of the fifth nerve. They enter the eye along with the optic nerve, upon the superior portion and external to the optic sheath. Division of the ramus causes greater pupillary reaction, i. e., contraction, than upon sectioning the ciliary or cervical ganglia. Hence, the iris must receive dilating fibres independent of the ciliary or cervical ganglia.

As the iris under these various conditions still responds to eserine and atropine, and as these latter only affect nerve terminal centres, we are compelled to at least think of the ganglionic centres in the chorioid, iris, and ciliary body as announced long ago by Hulke[19], and Schweigger[20] (1858), and Meyer[21] (1893). These plexuses possess the autonomy of nerve centres and hence will assist us in explaining many pupillary phenomena otherwise inexplicable.

Accepting these facts regarding the peripheral and central nerve centres for the accommodation and iris reaction, it re-

[17]Adamück. Centralbl. f. d. med. Wissensch., No. 28, 1876. Hensen and Voelckers, Loco citato.

[18]Hulke. See gen. ref.

[19]Schweigger. Loco citato.

[20]The writer has many times noticed this condition while experimenting with these ganglia in reference to glaucoma.

[21]Meyer. Zur Kenntniss zum Bau der Iris; Biolog. Untersuch. Neue Folge. V., 1893.

mains to be demonstrated whether the sympathetic nerve has any connection with the accommodation. It is an axiomatic fact that the motor oculi is the nerve of active accommodation and ciliary muscle contraction. Also an axiomatic fact, that a paralysis of a part of the third nerve causes a paresis or paralysis of the act of accommodation. In vain have experimenters tried to prove the sympathetic nerve supply for it. The sympathetic fibres were supposed to be inhibitory accommodation fibres[22]. It would be truly convenient to have this inhibitory supply in explaining many apparently unconnected symptoms regarding lesions in these various centres.

Morat and Doyon, upon cutting the sympatheticus and stimulating the cut end, noticed an enlargement of the catoptric images and concluded therefrom that the nerve acted as an inhibitor and assisted in the accommodation for distance. Upon repetition of this experment by others[23], it was found not to prove true. Langley and Anderson emphatically deny Morat and Doyon, and are upheld by Hess[24], Rœmer and Dufour[25].

These fibres were supposed to call forth a decided flattening of the lens through their action on the inner layer of the ciliary muscle. Though there are two distinct muscle layers, an outer and an inner, they act as a single muscle[26] (Bruecke in Mueller's Archiv., 1846, p. 370). As far as we know their contraction causes a drawing forward of the ciliary body and processes, a relaxation of the zonnula of Zinn, a swelling

[22]Morat and Doyon. Le grand sympathétique nerf de l'accommodation pour la vision des objets éloignés; Compt. Rend. de l'Acad. des Sc. and Archiv. de Physiol., III, 507, 1891.

[23]Langley and Anderson. On the mechanism and movement of the iris; Jour. of Physiology, XIII, 6, 1892.

[24]Hess. Arbeiten aus d. Gebiete d. Accommodationslehre; Graefe's Archiv. f. Ophth. XLIX, 2, 1899. Graefe's Archiv. f. Ophth. XLII, 1896, and, XLIII, 1897.

Hess. Bemerkungen zur Accommodationslehre; Centbl. f. prak. Augenheilk., July, 1899.

[25](Dufour and Rœmer assisted him (Hess) in this work).

[26]That the ciliary body was muscular, was a well known fact to Kepler in 1611; Eustachius in 1722, even had a diagram thereof. Porterfield (1759), Morgagni, Briggs and others knew of the action of the ciliary muscle. Zinn, however, denied that they ever knew the existence of the muscle. In 1846, Bruecke described the "tensor choroideae;" about this time it was also described by Bowman. In 1856, H. Mueller described the inner muscular layer of the ciliary body.

of the anterior surface of the lens and a sinking of the same. Hensen and Voelckers needle experiment[27] absolutely proves that there is no muscle in the eye purposely to assist in focusing it for the distance. The catroptric images also seem to disprove this assumption.

Having determined that the ciliary muscle, the third nerve, and a separate central nucleus controls the accommodation, we may ask what relation the action of the iris sustains to this function. The contraction of the pupil during accommodation is the oldest known symptom in connection with it (note).

It was long thought that accommodation depended on the contraction of the iris. However, Koster[28], and before him Weber and Hess[29] had determined the pupil contraction to be only associated with convergence and not accommodation. Tscherning[30] regards the accommodation pupil contraction as a mechanical manifestation. At one time it was thought that the contraction of the iris was due to the amount of blood in it during the act. This idea is untenable, as it has never been demonstrated. The blood pressure in the iris and the ciliary body depend upon their inherent contraction activity as is seen in any other muscle. The contraction of the iris is not an essential factor in accommodation, but only an associated physical phenomenon.

[27]H. and V's., experiment. They inserted needles into the equator of an enucleated eye (and earlier into the living animal) then electrically stimulated the ciliary body region and watched their motion as follows: One needle advanced forward, showing advancement of the chorioid; the one through the ciliary did not move; one very near the macula appeared to remain perfectly quiet (latest references to this experiment is made by Hess, in Graefe-Saemisch, 1902).

NOTE.—Scheiner (1619), Morton and Haller (1769), tried to explain all accurate accommodation by the action of the iris. It was Hering and Donders who demonstrated the synchronous action of pupillary and ciliary contraction during accommodation, but they did not say whether the pupillary contraction was a reflex act or not during accommodation, which it truly is.

[28]Koster. Bemerkungen zu den Versuchen von Hess ueber d. Accommodation Archiv. f. Ophthal. XLVII, 1., 1898.

Koster. Ibidem; Entoptische Beobachtungen; Archiv. f. Ophthal. XLVI, 1., 1898.

[29]Graefe-Saemisch Handb. d. gesammt. Augenheilk., Bd. VIII, Kap. XII (1902).

[30]He demonstrated a dilatation and a contraction of the pupil on the cadaver by inserting a hypodermic syringe and gently drawing the piston forward and backward.

Some facts have been set forth which warrant us to speak of paresis or paralysis of accommodation as a separate manifestation. From the foregoing we can look upon this affection of the accommodation at times as independent of internal or external ophthalmoplegia. It matters little whether you accept the Young[31]-Helmholtz or the Tscherning[32] theory of accommodation, the symptoms are the same.

With a paralysis or a paresis of accommodation, it is then not so strange to have the other so-called associated functions involved to a certain degree. The loss of the function of any one of these three materially influences the extent of action of the remaining two. This difference in the functioning of the other two may, in many instances, be only apparent. (It is not deemed necessary to enter upon the actual mechanism of accommodation, only a brief outline[33] is needed).

From a standpoint of practical symptomatology, there is very little difference between a paralysis and a paresis[34]. Yet, pathologically often a great difference is manifested. A paresis is frequently a partial functional loss or inability, with no demonstrable lesion, excepting those perhaps peculiar to exhaustion[35]. A paralysis on the other hand is very often the

[31]Young demonstrated accommodative changes to take place in the lens by experiments now renowned (On the Mechanism of the Eye, Phil. Trans. 1801).

[32]Vide gen. ref. No. 6.

NOTE.—Descartes, 1637, was the first to associate convexity of the lens with accommodation (Trans. de homine). Mauthner gives credit for this to Scheiner in 1619 vide M. Augenmuskellaehmungs Lehre, 1889.

[33]The act of accommodation ensues as follows: 1. Stimulous from central portion of third nerve nucleus. 2. Contraction of ciliary muscle. 3. Slight forward traction of chorioid and perhaps of retina. 4. Relaxation of the Zonula. 5. Increase in the ant. convexity of lens, with lessened vertical and increased antero-posterior axis. 6. Sinking of the lens. 7. Decrease in the depth of ant. chamber. 8. Trifle forward movement of iris. 9. Perhaps the vitreous also moves forward. The associated functions are: 1. Contraction of iris. 2. Convergence, with a trifle turning downward of the eye.

[34]An exhaustion of a muscle is often similar to a paresis. At times they are not to be differentiated.

[35]Paralysis. The suspension or abolition of functional power, especially in the nervous system, in which case there is a temporary or permanent loss of the power of motion or sensation or both, in the parts supplied by the affected nerve.

Paresis. An incomplete paralysis, especially when not associated with any demonstrable organic lesion—limited to motion and not to sensation (Foster).

result of active pathologic changes—peripheral, central, or both.

We must differentiate between an active and a passive variety of paresis or paralysis of the act of accommodation. That is to say, active when the ciliary muscle or nerve function is involved; passive when the lens or the zonula alone are implicated. In the active, we distinguish a myopathic and a neuropathic type. Again, the active type is either a peripheral, a central nucleus, or an orbital lesion. The paresis is more often a peripheral lesion (myopathic) rather than a nuclear or orbital; while the paralysis is apt to be a nuclear or a peripheral nerve lesion.

The changes in the passive portion yield the same symptoms as those in the active part. Therefore the two conditions are easily confounded[36]. Any change in the passive part, either in the lens or zonula, is demonstrable by the shrinking of the total range of accommodation. However, not every ciliary muscle paralysis is evidenced by a receding near point and a shortening of the accommodation range.

Either the active or the passive variety may appear as a separate manifestation, unassociated with any other symptom. But as a symptom itself, only the active variety can be associated with an ophthalmoplegia interna, externa, or totalis. In the former two it may be absent, but in the totalis it must be present.

To make the diagnosis of paresis or paralysis of accommodation, we have to take into consideration the actual range of accommodation and to determine the range of the accommodation which is characteristic of that age of the patient in whom the paresis occurs. This latter is dependent on the passive part of the accommodation. On account of the increased hardness in the lens with age, so in proportion does the contraction of the ciliary muscle become optically less evident. In old age the effect of this contraction is entirely latent. Hence it follows that any ciliary muscle contraction is more readily recognized in the decreased accommodation range in the younger individuals, as they have very

[36]Accommodation paresis is not the same as ciliary paresis. This is evident in presbyopia, which is an accommodation paresis but not a ciliary paresis. A normal eye can have the normal range of ciliary contraction, yet the altered lens will not respond.

little that is latent. In the aged,[37] say 70, the ciliary muscle can be absolutely paralyzed and yet no change in the range of accommodation or recession of the near point takes place.

The objective proof of a ciliary muscle paresis or paralysis is only demonstrable when it is greater than the range of latent accommodation. In other words, it must reach such a degree that by the utmost contraction of the ciliary muscle a complete relaxation of the zonula is not obtained. Again, any decrease in the manifest accommodation (peculiar to the age of the patient at the time) is evidence of the presence of a ciliary paresis or paralysis. But on the contrary, not every ciliary paresis or paralysis is evidenced by a corresponding decrease in the manifest range of accommodation. This point is well demonstrated in presbyopia.

It is also worth noting that a graduated scale for the amounts of paresis or paralysis can not be established as for presbyopia. Though, in a sense presbyopia is a paresis of the ciliary muscle according to Foster[38] and Kirk[39]. One reason is that the gradual recession of the near point and the latent range of accommodation to become manifest is a physiological process, progressing uniformly;[40] the other condition is a variable pathologic process, decidedly unequal.

In young people the amount of paresis can be approximately measured, but beyond 65 our present methods fail to establish whether the ciliary muscle is paretic or paralytic. Therefore ciliary paralysis is only of diagnostic import or becomes recognizable as a distinct manifestation in practically the "presbyopic." Then, too, only when the implication

[37]Presbyopia is a physiological lens hardening and never (so many say) due to any changes in the active portion of the accommodative mechanism. It is an open question whether an abnormal early hardening of the lens ever takes place, which can simulate presbyopia. It must be a hardness not due to any disease or complication.

[38]Foster, M. Text-book on Physiology, 1891, 6th ed., p. 47, says: "In presbyopia the failure or loss of accommodation may be due to a loss of the elasticity of the lens, or an increasing weakness in the ciliary muscle or to the parts becoming rigid."

[39]Kirk holds the identical view as Foster (Hand-book of Physiology, p. 71).

[40]One 25 years old with a normal near point can have as much ciliary paresis as a child of 10 or 15 whose manifest accommodation range is about one-half the normal and whose near point is correspondingly removed.

is greater than the latent range of accommodation does it annoy the patient.

As already said, a paralysis or paresis of the accommodation or of the ciliary muscle may yield the same clinical picture. Therefore, we must be careful in using this symptom as a diagnostic or prognostic point.

Mydriasis, complete or partial, frequently accompanies a paresis or paralysis of the ciliary muscle. Yet, as we have shown, one action is independent of the other. In a few instances a myosis was noted, with a paretic ciliary muscle[41].

In the peripheral paresis or paralysis, the ciliary body or processes are directly or indirectly involved[42]. The neuropathic involvments are frequently central, or peripheral while the myopathic are peripheral.

In general, the symptoms of a paralysis of the muscle of accommodation is dimetrically opposite to that of a spasm. The extent of the involvment depends upon whether the eye is emmetropic, brachymetropic, or hypermetropic; and, whether the patient is presbyopic or not. Paresis on the other hand simulates more closely what we term asthenopia, and often unable to be differentiated with our present day methods. The disturbances are greatest in the hypermetropic, as both near and far points are affected. Next comes the emmetrope, in him the near point is perhaps only farther removed than normal. The brachymetrope suffers the least, especially if the amount of error be 3 or 4 dioptres and no glasses were ever worn. In him, complete paralysis may take place and no subjective symptoms be complained of[43].

The annoyance is not very marked if the lesion is limited to one eye. A frequent accompaniment is micropsia. As already stated, other symptoms are often associated with this condition of the ciliary muscle, that we can provisionally tabulate them as follows:

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[41]This condition must be one form in which there is a central and a peripheral lesion.

[42]There may be a complete rupture of the zonula giving the same symptoms as a complete paralysis, yet the ciliary function is intact. Even vitreous disease has been reported to cause a relaxation of the zonula and resemble a paresis (Mauthner, Donders).

[43]This is particularly noticeable should a small amount of ciliary power be left. On account of the effort of the residual power of accommodation, the objects seem nearer and therefore smaller.

1. Accommodation alone affected—incomplete ophthalmoplegia[44] interna.

2. Accommodation and iris affected—complete ophthalmoplegia interna.

3. Accommodation, iris and external eye muscles—ophthalmoplegia totalis.

Any of these conditions may be a nuclear, a peripheral or an orbital lesion. The nuclear type of paralyses, especially of the progressive order, often håve as their first symptom, a paralysis of the accommodation[45] (Mauthner, Graefe, and others). These nuclear affections may be bilateral or unilateral, complete or incomplete (vide foot note on ophthalmoplegia). The orbital lesions are more readily understood than the nuclear, as we may look upon them as peripheral in nature.

It is indeed difficult to explain how some constitutional or even brain lesion will practically isolate and only implicate the nuclear centre for accommodation. It can only be explained upon the basis of Huebner, Hensen and Voelckers. The nuclear paralysis or paresis may have the following brain lesions as its cause: hemorrhage, embolism, meningitis, thrombosis, tumor, abscess, cerebral syphilis, internal hydrocephalus, and posterior spinal sclerosis. Syphilis is by far the most frequent underlying cause for the nuclear implications. However, not in all of these is the entire centre of accommodation involved, unless a complete ophthalmoplegia ensues.

The ciliary muscle itself may be incapable of reacting in the proper proportion to the nerve stimulus and this would evidence itself as a paresis rather than a paralysis. This may be due to inflammation and its results. Senile changes in the ciliary muscle can produce a paresis. The constant inactivity of the ciliary muscle in the various forms of strabismus can give rise to a paresis or even a paralysis. Excessive nutritive

[44]The term ophthalmoplegia is, generic, having reference to the paralysis of any of the ocular mûscles, intra- or extra-ocular. Mauthner (Die Lehre der Muskellaehmungen, p. 306-307) gives this very comprehensive classification:

$$\left.\begin{array}{c}\text{Central}\\ \text{or}\\ \text{Peripheral}\end{array}\right\}\text{ophthalmoplegia}\left\{\begin{array}{l}\text{perfecta}\ \left\{\begin{array}{l}\text{unilateralis}\\ \text{bilateralis}\end{array}\right.\left\{\begin{array}{l}\text{exterior}\\ \text{interior}\end{array}\right.\\ \text{imperfecta}\ \left\{\text{ibidem}\right.\qquad\left\{\text{ibidem}\right.\end{array}\right.$$

[45]The case of Heinrich Heine, the German Poet, is a celebrated case of progressive nuclear paralysis.

disturbances may also call forth a condition not unlike a paresis of the ciliary muscle.

The various conditions which may give rise to a paresis or a paralysis are as follows:

SYPHILIS.

Under this heading we may include tabes. The ciliary muscle is very often the first that suffers in tabes. The paresis, more often though a paralysis, is bilateral. Unilateral paralysis of the accommodation without mydriasis but with the characteristic anesthetic temple areas is also seen in tabes (Galezowski[46]). In the majority of the Argyll-Robertson pupils[47] will a paresis of accommodation be found. In simple confirmed syphilis, the accommodation implication is very late in manifesting itself, if at all. Brain syphilis frequently involves the accommodation centre very early, often being periodic and recurrent. This is not very strange when we consider the blood supply of this centre and accept the view of Adamkiewicz[48]. But why the centre for the intra- or extraocular muscles are so frequently involved in the early stage of syphilis can not be explained, unless it is due to their peculiar blood supply. Graefe says frequent recurring accommodation paresis with mydriasis, and alternating bilaterally, should lead one to suspect mental disease, especially if syphilis is present.

Usually the paralysis is bilateral and accompanied by either a partial or complete mydriasis. This is particularly true in tabes (Galezowski). Exceptions to this, however, are noted by Alexander, Kirmisson, Jeaffreson, Hosch, Ferron and Mauthner (vide special ref.) Hutchinson in his early reports (Med. Chir. Trans., 1878), mentions unequal in-

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[46]He considers this condition almost pathognomonic of tabes.

[47]The Argyll-Robertson pupil is a nuclear lesion, often attributable to a hemorrhage. From here the lesion travels from the aquaeductus Sylvii to the floor of the third ventricle and destroys the connection between the third and first nerves without affecting the sphincter of the iris.

[48]Adamkiewicz has demonstrated that the sclerotic process in tabes is determined by the course of the arteries, especially in the brain. (The original is not accessible—quoted from Schmeichler, Knapp Archiv. Bd. XII. p. 335-364, 1883). The original article is: "Die Blutgefaesse des menschlichen Rueckenmarkes; Sitzungsb. der Academie der Wisschf. in Wien, 1882, Bd. IXXXIV.

volvement of the power accommodation in syphilitics. The specific involvement of accommodation is more apt to be central than peripheral and often depends on minute hemorrhages into the nucleus. This condition has been demonstrated post-mortem in a number of cases. All the sudden ophthalmoplegias with recurrences are indicative of syphilitic nuclear lesions, rather than peripheral.

Inherited syphilis does not as frequently cause a paralysis as the acquired form (St. Bernheimer, gen. ref. No. 21, p. 14). A latent form of syphilis can be recognized by a paralysis of accommodation with pupillary differences or bilateral mydriasis. These latter two conditions are often for a long time the only expression of a syphilitic infection. However, syphilis, especially of the nervous system, is more prone to involve the extra-ocular muscles than the intra-ocular, giving an ophthalmoplegia externa (complete or incomplete).

J. Hutchinson's writings show very clearly that the ciliary muscle implication is very rare in inherited syphilis.

The prognosis in this class of cases is not very favorable or even encouraging. Alexander (vide special ref.) does not believe a cure ever takes place.

Sympathetic Ophthalmia.

In this direful disease ciliary muscle paralysis may be a very early manifestation in the sympathizing eye. Fuchs and Cuignet lay considerable stress upon its being fairly diagnostic, providing conditions for sympathetic ophthalmia are present. The writer can affirm this observation in a case which he had under treatment. How this ciliary paralysis is brought about is a question. Randolph's researches on the influence of toxines in inflammations of the eye are of paramount interest in this connection. Whether it is a peripheral or a central paralysis has not been stated. The writer considers it a pure peripheral lesion, as are so many of the toxic type.

Perhaps it is a neuropathic paralysis. The mydriasis, which often is of a moderate degree, is likewise a peripheral lesion. In sympathetic irritation this ciliary complication has not as yet been reported, hence in doubtful cases this symptom will prove of some value.

Local Peripheral Causes.

The paresis or paralysis here are usually secondary to some disease in the iris, ciliary body, choroid, or retina. If it follows one of the mentioned causes it is of the myopathic type, and it is then the result of plastic exudates or organized inflammatory material binding down the ciliary body and processes. Atrophy of the muscle is then prone to follow these changes. It is not a want in the nerve stimulus, but an inability on part of the muscle to contract. This condition may account for the reduced vision in such cases that still have clear media and no other complications to explain the reduction.

Glaucoma frequently produces a paralysis or paresis of the accommodation. More often it is a paresis. We are all familiar with this symptom, and often have it as a premonitory sign, recognizable by the frequent desire to change the "glasses." This condition is more often witnessed in that form of glaucoma wherein we have a shallow anterior chamber and a markedly dilated pupil. However, it is quite evident that the passive part of the accommodative mechanism suffers to a certain extent as well.

Injuries in the immediate vicinity of the eye frequently call forth a paralysis of the accommodation. Injuries to the cranium may yield nuclear accommodative interferences, with more of a general ophthalmoplegia. Very often there is a complete rupture of the zonula, which will cause a passive paralysis, as the ciliary muscle is left intact. This form of paralysis is not rare, as is evidenced by Power, Harlan[49] and others.

Defective teeth are also responsible for ciliary paresis. Schmidt-Rimpler and Schmidt (1868) have cited a series of cases of asthenopia of the paretic type that were due to defective upper teeth. This is a peripheral reflex paresis. Schmidt[50] is inclined to think it very common indeed. Few cases were observed by the writer. No recent reports are at hand. Linnell[51] (1884) reports a case of paretic ciliary accommodation as being due to an irritation of the superior

[49]Harlan and Power. Vide special ref.

[50]Schmidt. Vide special ref. He found 73 cases in a series of 92.

[51]Linnell. Vide special ref.

maxillary nerve. This must be the basis for the other cases as well.[52]

Over-exertion of any description is a fruitful cause for paresis of the ciliary muscle. It is peripheral and perhaps many of the accommodative asthenopias come under this heading. Any strenuous occupation or the so-called misuse of the eyes may give rise to it. Panas[53] mentions a case of unilateral paralysis with amblyopia as the result of undue exposure to intense electric light. Working over bright fires seem to cause it also (Colsman).[54] Mydriasis as a rule does not accompany this form. Students, typewriters, and electricians form a large contingency.

This variety is mainly due to the accumulation of waste energy material. Hutchinson's[55] cases (v. special ref.) following shock and lactation will properly belong to this category.

Poisons, either local or general, very often produce paresis or paralysis. As to the local ones, we need only mention the cycloplegics and their allied group of remedies. It is often a very important symptom in meat, fish or vegetable poisonings. It is more in the nature of a marked paresis than an outright paralysis. Mydriasis is often an associated symptom. The agent is invariably a ptomain and acts peripherally, in a manner similar to the cycloplegics. Therefore it is apt to be a nerve paralysis. Very often it is the first symptom which manifests itself in these cases. A like condition has been noted in tyrotoxicon poisoning (Fisher, Fuerst, Weiss, Leber, Knies, Groenouw, vide special ref.). In this particular we must not forget to mention the tobacco, alcohol, cocaine and morphine habits. In alcohol it is a paresis from the beginning, while in tobacco, it is a spasm first, which later is followed by the paralysis. In cocaine, we have a paresis followed by a complete paralysis.

Let us now consider some of the diseases such as diabetes, diphtheria and the like with reference to ciliary paralysis and paresis.

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[52]The disease travels by way of the spheno-palatine and ciliary ganglion, the connecting link being a small nerve fibre.

[53]Panas. Vide ref.

[54]Colsman. This is a very unique case. Vide ref. No. 9.

[55]Schapringer's case of paresis with apparent myopia may be of this class, though he does not say so, yet the history points to it.

DIABETES[56].

Very frequently diabetes involves the accommodation apparatus[57]. Whether this involvment is central, peripheral, or due to the accompanying reduced muscular vitality which is common to diabetics, is still a debated question. No doubt we can accept all three causes at times. It is usually a paresis and seldom associated with mydriasis. Von Graefe first called attention to this lesion in 1858 and since then many observers have recorded cases. Often it is among the first symptoms. Many regard it as a toxic manifestation and the writer shares the same view. For, upon the decrease in the glycosuria the intra-ocular paresis rapidly improves[58]. Jacobson looks upon the paresis as a peripheral neuritis or as a hemorrhage. Foerster, as many others, regards it as due to the general muscular weakness. It may be a nuclear lesion and then unilateral (perhaps a hemorrhage). The perverted presbyopia must not only be looked upon as a ciliary paresis but also as due to changes in the lens itself.

INFLUENZA[59].

The interference of accommodation was among the first "so-called out of the ordinary symptoms" recorded. At times the paresis or paralysis, as in diphtheria, appears some time after the patient is entirely well. Very often though, it comes on during the progress of the attack. Rarely does it appear as a premonitory symptom. The disease being of germ origin, we can well attribute the accommodation interference of some toxin, just as in diphtheria. It apparently is of a peripheral type; when brain complications arise early in the disease, then nuclear implications are prone to occur.

(*Continued next issue.*)

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[56]Berger, E; B. first advanced the toxic theory in diabetes, not only of the intra, but also of the extra-ocular muscle affection. He assigns his reasons in a very valuable contribution (vide ref.).

[57]Galezowski. In 1883, in a thesis, he says 7 per cent. of all diabetics have some muscle paralysis. No doubt some are nuclear hemorrhages.

[58]Knies. K. favors the acute intoxication theory. (It does seem a rational view both here and in albuminuria). See note on Berger.

[59]Williams. R. A. (v. special ref.) gives a detailed account of paralysis and paresis in influenza, with a review of facts. Statistics are very meager, but would not be, were the cases reported.

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ORIGINAL ARTICLES.

PARALYSIS AND PARESIS OF THE MUSCLE OF ACCOMMODATION.*

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(*Continued from last issue.*)

THE affection may be unilateral, but as a rule it is bilateral. The paresis occurs very often when the nervous manifestations are pronounced or marked muscular enfeeblement follows convalescence. Iris complications may be absent and usually are very slight if present at all. This paresis or paralysis may be a part of a more extensive ophthalmoplegia[60], either interna or externa. If so, then brain symptoms are invariably noted. The prognosis ordinarily is very favorable.

DIPHTHERIA[61].

A very large quotum of accommodation interference is furnished by diphtheria. The severity of the diphtheria bears no relation to the frequency or severity of the paresis. Mild

*Read before The American Academy of Ophthalmology and Laryngology at Indianapolis, Ind., April 9, 1903.

[60]Uhthoff. (Deut. Med. Wochschr. No. 10, 1890). U. cites a case of ophthalmoplegia interna. Gayet (Jahr. f. Aug. 1876) cites a case of total ophthalmoplegia externa, without implication of the levator palpebræ superioris. Guttmann. Loco citato.

[61]The largest statistics on this point are furnished by Moll and Remak (v. special ref.).

attacks often are followed by the most protracted forms of paralysis. The young and the middle-aged share alike. Frequently pharyngeal and laryngeal pareses accompany the other. It generally makes its appearance when full convalescence has been established. The onset is usually sudden; the attack continues from ten days to two or three weeks. Recovery is the invariable rule, and this without specific medication.

It is often a valuable diagnostic point in doubtful cases of diphtheria. The infection must have been diphtheritic, to the contrary notwithstanding, when it follows a sore throat. No angina[62] produces a similar paresis or paralysis. It is not necessary to have the classical diphtheria in order to get this complication. A diphtheritic wound anywhere can give rise to it.

Some very peculiar cases are recorded in this particular[63]. If the accommodation interference is associated with absence of patellar reflex, tabes may be very closely simulated[64]. The attack is usually bilateral, though unilateral[65 and 3a] cases are on record (often accompanied by other symptoms).

The introduction of antitoxine did not abate the frequency of post-diphtheritic paralysis as was hoped[66]. The administration of it for the paralysis is as good as useless[67]. It does not cut the attack short, nor does it transfer a paralysis into a paresis, as was thought at one time. Behring never took this complication into consideration when he was experimenting with the serum. There is no reason why he should have, as the prognosis is at all times absolutely favorable. But one fact is evident, namely since the serum, the post-diphtheritic

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[62]Bass. Monat. f. Augheilk., 1886, p. 273. A case due to mumps (?) and sore throat.

[63]Gayton, W. In the London Lancet describes a case of post-diphtheritic accommodation paralysis following genital diphtheria (v. special ref.)

[64]Jessop, H. W. V. special ref. The only case on record.

[65]Dufour. He cites a case of monocular diplopia following diphtheria. It must have been of the myopathic type and involving only a part of the muscle. (v. special ref).

[3a]. Wolfe. He says "both eyes are rarely affected" (1882). The statistics of Moll and Remak do not uphold him. (v. special ref.).

[66]Janowski (v. ref.). "Die Kranken werden jetzt die Laehmungen wohl oefters erleben als vor der Serumperiode und dementsprechend wird also die absolute Zahl derselben seit Einfuehrung letzterer steigen."

[67]Hertel and Graefe (v. special ref.) both maintain this idea and cite cases in support of their view.

paralyses are more frequent. Statistics, however, seem divided on this score. Schmidt-Rimpler holds that the antitoxine hastens the return of the accommodation. This has not been the observation of others nor of the writer.

Rosenmeyer[68] and Boerger[69] in a large series of cases say that the serum has reduced the number of paralyses. Perhaps if the serum were given in the very outset of the disease and not on the third or fourth day as is so common, the number of paralyses might be less. The delay gives the toxines a chance to become disseminated and a severe attack is not needed for a production of these pareses. St. Bernheimer inclines to the view that the serum has a beneficial influence on the paralysis. The paresis may cause a persistent asthenopia, though it never remains permanent[70].

The diphtheritic paralysis is a peripheral one[71]. Hensen and Voelckers place the lesion in the nerve endings. Knies[72] says it cannot be a hemorrhage or a terminal nerve inflammation but some toxin which directly affects the ciliary muscle. This belief is now accepted by quite a few clinicians[73].

HYSTERIA[74].

In hysteria a spasm of the accommodation is more often seen than a paralysis. Charcot and Parinaud have recorded unilateral diplopia as due to a paresis or a paralysis of the muscle of accommodation. Micropsia is very often complained of in this condition while it is rare in the other forms of paralysis. Here, too, the mydriasis is apt to be unequal. Children furnish the largest quota of cases, and in them it

[68]Rosenmeyer. Wien. med. Wochenschr., 1886, No. 13 and 14.

[69]Boerger. Ueber 100 Faelle von Diphtherie mit Serum behandelt, Deut. med. Wochenschr., 1895, No. 52.

[70]St. Bernheimer. Aetiologie u. path. Antomie d. Augenmuskellaehmungen; Graefe-Saemisch Handb. d. gesam. Augenheild., bd. VIII, S. 16-80, 2te Ausgabe.

[71]In the days of Donders (1860) and Nagel (1866), they did not know whether it was a peripheral or central lesion. For them unilateral paralysis confirmed peripheral, and bilateral paralysis, central lesions. This is obviously incorrect.

[72]Trans. of Ophthal. Soc. U. of K., vol. vi, 386.

[73]This view coincides with those of Randolph; Amer. Med. Sc., Nov., 1902.

[74]Donders speaks of this condition as "painful accommodation."

(a). Foerster designates it as "hysterical kopiopia."

(b). Nagel calls it "hyperaesthetic ciliary muscle."

is the first symptom of a general hysterical manifestation. Perhaps spasm and paralysis are of like frequency, the former in the nervous and the latter in the plethoric type of hysteria. So long as the far and near point are not coincident, the patient will enjoy fair vision. This depends a great deal upon the static refraction of the eyes. Very few hysterical patients ever escape without accommodation interference. Parinaud holds that paralysis is rare in hysteria, though Galezowski and others have the opposite view. Both are right in a measure.

General Diseases.

In the greater majority of cases it is a paresis rather than a paralysis. Many of the infectious diseases as typhoid, malaria, pneumonia, scarlet fever, measles, whooping cough, neurasthenia (Grand-clement), scorbutus (Bristowe), and multiple neuritis (Oppenheim) develop a paresis either during the attack or directly upon convalescence. The cause here is the general muscular enfeeblement that usually accompanies these diseases. We can regard the most of these cases as a paresis due to exhaustion of the ciliary muscle, hence myopathic, and not as a motor oculi nerve interference, and therefore not a true paralysis. No doubt the toxines which circulate in the system as a result of the disease play no minor role in producing these pareses.

The implication of the ciliary muscle in this class of cases is of the milder variety, and a rather rapid recovery follows the toning up of the general muscular system. These patients complain of a severe accommodative asthenopia. In fact, it so closely resembles this, that many a pair of glasses is prescribed, which would not have been necessary had the patient had the proper care and attention immediately following the sickness. It is simply to avoid this ciliary paresis that we prohibit the patients from reading or using their eyes very much during any protracted illness.

Many of the anaemias (as chlorosis, simple anaemia, and leukaemia,) are prone to have some accommodation trouble and usually it is a paresis of the ciliary muscle; this is particularly true in chlorosis. Much suffering could be spared the chlorotic if the physician would but recognize this point. A proper correction will relieve the trouble, allow the ciliary

muscle to recuperate; and, upon the cure of the chlorosis, the glasses are in most cases not needed.

Rheumatism, gout and dysentery lay claim to quite a few cases of ciliary paresis. Even the involvement of the accessory sinuses of the nose are responsible at times for a paresis of the ciliary muscle.

Strange, that tuberculosis with all its disseminating tendencies seldom causes a paresis, excepting that which may be due to muscular feebleness. There are many more diseases in which we may have this ciliary muscle implication, but the ones mentioned will suffice. The writer did not intend to dwell at all upon purely nuclear or orbital lesions, though reference has been made thereto.

In general it may be stated that a peripheral paresis and paralysis develops slowly as compared with the nuclear type. This serves as a point in differential diagnosis at times. Again, in the peripheral varieties mydriasis is often wanting, while it usually accompanies the nuclear. In many instances where toxins are concerned it seems as if they exhibited selective tendencies. One cause for the frequency of this selection, perhaps, can be ascribed to the fact that the ciliary muscle and its nerve supply have a highly differentiated organ. No doubt in the autotoxic type, though the lesion is frequently peripheral, yet the nucleus may be slightly involved. The same may be said of the purely toxic type.

By far the majority of the cases are peripheral paresis or paralysis, as only the act of accommodation is involved. If more than this is involved the chances are that we are dealing with some central or orbital lesion. Sufficient proof, however, has been given to show that the loss of accommodation can, at times, be a purely nuclear lesion without involving any of the other functions of the eye. Enough has been said to caution us not to neglect this apparent simple symptom in arriving at our diagnosis in such cases where little signs are of importance.

Treatment.

Little remains to be said about this. The indications are very obvious, namely, treat the underlying cause. For, a paresis or a paralysis of the ciliary muscle does not develop as such, but, whether peripheral or central, it has an under-

lying factor. The palliative treatment is the use of suitably adjusted lenses. The prescribing of eserine or strychnia may do some good, but the writer believes it is only apparent.

In general it may be said that the peripheral types offer better prognoses than the nuclear or central variety. The only caution to observe is not to mistake an asthenopia for a paresis or a paralysis.

The toxines of the various infectious diseases act on the peripheral mechanism of accommodation in much the same manner as the mydriatics or miotics. Finally, from what has been said, we notice that paresis or paralysis of the ciliary muscle as a peripheral symptom is quite common.

GENERAL REFERENCES.

[1]Hess, Carl. Die Anomalien der Refraction und Akkommodation des Auges mit einleitender Darstellung der Dioptric des Auges; Graefe-Saemisch Hd. der Ges. Augenheilk. (1902), Bd. vlll, xll Kapitel, S. 255 et seq.

[2]Hensen and Voelckers. Ueber den Ursprung der Accommodationsnerven, nebst Bemerkungen ueber die Function der Wurzeln des Nervus oculomotorius; Arch. f. Ophth. (Graefe) Bd. xxiv, 1, 1878.

[3]Scheby-Buch. Augenmuskellaehmungen in der Diphtheritis; Archiv. f. Ophthal., Bd., xvii. 1, 5, 265.

[4]Voelckers. Ibidem.

[5]Iwanoff. Graefe-Saemisch; Handbuch der Augenheilk., Bd. 1, p. 276.

[6]Crzellitzer. Die Tscherningsche Accommodationstheorie; Archiv. f. Ophth. Bd. xlii. ivAb.

[7]Mauthner, L. Die Lehre von den Augenmuskellaehmungen., 1889, p. 293 et seq.

[8]Nagel, A. Refractions und Accommodations Anomalieen des Auges; 1866 (Tuebingen). p. 189-210.

[9]Colsman. Observations on cases of Paralyzed Accommodation; Arch. of Ophth. and Otol. vol. 2, p. 154-165 (1871). (Translated by Ch. Rodenstein).

[10]Randolph, R. The Role of the Toxins in Inflammations of the Eye; Jour. Amer. Sc., Nov., 1902.

[11]Dorsch, G. Ueber Accommodationsparese und Paralyse, sowie Hebetudo Visus; Aerzt. Intell. Bl., Muenchen, 1859, vl. p. 633.

[12]Harlan, G. C. Contraction of the Pupil with partial Paralysis of the Accommodation; *Phil. Med. Times*, 1870-71, 1. p. 279.

[13]Sprague, E. P. Paralysis of the Ciliary Muscle and subsequent loss of Accommodation Power of the Eye; Boston M. and S. J., 1862, Lxvl, p. 63-67.

[14]Dor, H. Ueber einen aussergewoehnlichen Fall von Laehmung der Accommodation; Mitth. der Naturf. Gesellschaft, Bern, 1868, p. 21-25.

[15]Berger, E. Les Maladies des Yeux dans leur Rapport avec la Pathologie génerale, 1892.

[16]Knies, M. Die Beziehungen des Sehorgans u. seiner Erkrankungen zu d. uebrigen Krankh. d. Koerpers u. s. Organe; Wiesbaden, 1893.

[17]Hulke, J. W. Ophthalmoplegia Interna; Trans. of Ophthal. Soc. U. K., vol. 1, p. 155 et seq.

[18]Greeff, A. Die Serumtherapie bei der Diphtheria des Auges und die postdiphtheritischen Augenmuskellaehmungen; Deut. med. Wochenschr. 1896, No 37.

[19]Hertel, E. Die Anwendung der Serumtherapie bei Diphtherie des Auges und postdiphtheritischer Accommodationslaehmung; Korrespondenzbdl. d. allgem. aerztl. Ver. von Thueringen.

[20]Hutchinson, J. On a Group of Symptoms indicative of diseases of the Lenticular Ganglion; *Lancet* (Lond.), vol. 1. 1878, p. 535.

[21]von St. Bernheimer. Aetiologie u. path. Anatomie d. Augenmuskellaehmungen. ibidem, Bd. v111, x11 Kapitel. (1902).

[22]Anderson (Cambridge). Effect on Pupil of Excision of the Ciliary Ganglion; Jour. Phys. vol. xxv11I, No. 3.

[23]Dolens. Note on the Extirpation of the Ciliary Ganglion; Bull. de la Soc. de Chirurgie, Paris, April 23, 1902.

PARALYSIS AND PARESIS IN DIABETES, TABES, INJURIES, POISONS, GRIPPE AND HYSTERIA.

[1]von Graefe, A. Accommodationsstoehrungen in Diabetes; Archiv. f. Ophthal.. 1858, vol. iv, Abth. 2.

[2]Seegen. Der Diabetes Mellitus, 2d. ed., Berlin, 1875.

[3]Schmidt, H. Ueber Accommodationsbeschraenkungen bei Zahnleiden; Arch. f. Ophth. (Berlin), 1868, xiv, iAbth., 107-137.

[4]Linnell, E. H. Reflex Paresis of Accommodation from Irritation of the Superior Maxillary; Tr. Amer. Hom. Oph. and Otol. Soc., 1884, vol. viii.

[5]Schmidt-Rimpler. Ueber Accommodationsbeschraenkung bei Zahnleiden; Arch. f. Ophth. (Graefe), 1868. Bd. xiv.

[6]Donders, F. C. Paresis of Accommodation after Diphtheria Faucium; Accommodation and Refraction of the Eye, 1864. p. 599. (Foot note on same page important).

[7]Groenouw. A. Fuenf Faelle von Accommodationslaehmung bei Fleischvergiftung; Klin. Monatsbl. f. Augenh., 1890, xxviii.

[8]Leber, T. Beobachtungen ueber Accommodationslaehmung und sonstige Stoehrungen der Augennerven bei Wurstvergiftung; Arch. f. Ophth., 1880, xxvi, 2Abth., 236-249.

[9]Fischer. Drei Faelle von Ptomainvergiftung, verursacht durch den Genuss von Krebsen; Petersburger med. Wochenschr. 49, S. 472.

[10]Fuerst. Fischvergiftung; Muench. med. Wochenschr., 1898, S. 1450.

[11]Weiss. Ueber Pilzvergiftung mit Augenmuskellaehmungen; Zeitschr. F. klin. Med. xxxv, Suppl. (1879).

[12]Price, G. H. Paresis of Accommodation in a young patient following Grippe; *Ophthal. Record*, 1895, vol. v, p. 381.

[13]Williams, R. A. A Case of Paralysis of Accommodation after Influenza; *Ophthal. Review*, 1898, p. 250.

[14]Williams, R. On Paralysis of Accommodation after Influenza; *Brit. Med. Jour* 1898, 11, p. 485 and 1964.

[15]Uhthoff. Ueber einige Faelle doppelseitiger Accommodationslaehmung in folge von Influenza; Deutsche med. Wochenschr., 1890. No. 10.

[16]Galezowski. Paralysis of Accommodation in Tabes; Trans. Société de Biologie, Feb. 18, 1888.

[17]Power, H. Paralysis of Accommodation after a fall on the head; Ophth. Hosp. Rep., 1875, vol. viii, p. 178-180.

[18]Harlan, H. Report of a case of injury with accommodation interference; *Amer. Jour. of Med. Sc.* 1871, S. p. 139, vol. Lxi.

[19]Hutchinson, Jonathan. (a). Loss of Accommodation from Shock; (b). Loss of Accommodation in Lactation; Ophthalmic Hos. Rep., vol. vii, p. 38-39.

[20]Dufour. Diplopie monoculaire dans la paralysie de l'accommodation (xii, Congress int.); Revue génèrale d'Opht. p. 525.

[21]Steffan. De l'anesthesie de la retine avec retrecissement concentrique du champ visuel; Bericht d. Ophthal. Gessellsch., Heidelberg, 1873.

[22]Chibret. Ibidem, 1892.

PARESIS AND PARALYSIS IN DIPHTHERIA.

[1]Joseph, H. W. Case of diphtheritic cycloplegia with absence of knee jerks, defective color vision, and visual field contraction; Trans. Ophth. Soc. U. K., 1885, vol. vix, 366-388.

[2]Landman, O. Cycloplegia post-diphtheritica; *Amer. Jour. Ophthal.* 1889, vol. vi.

[3]Hutchinson. Diphtheritic paralysis, in a very slight case; *Br. Med. Jour.* (Lond.), 1888, 1, p. 1374.

[4]Risley, S. D. Paralysis of Iris and Accommodation, following Diphtheria; Phil. Polyclinic, 1892, 1, p. 95-97.

[5]Schwenk, P. N. K. Post-Diphtheritic Ocular Paralysis; *Med. News*, Feb. 14, 1903.

[6]Remak. 100 Faelle von postdiphtheritischen Augenmuskellaehmungen; Centralbl. f. prakt. Augenheilk., 1896, Juni, S. 161.

[7]Gayton, W. A case of paralysis following diphtheria of the genitals; *Lond. Lancet*, 1884, May 26.

[8]Moll. 150 Faelle von postdiphtheritischen Accommodationslaehmungen; Centralbl. f. Augenheilk., 1896, Jan. S. 2.

[9]Schmidt-Rimpler. Diphtherieheilserum und postdiphtheritische Accommodationslaehmung; Centbl. f. Augenheilk., Dec., 1894.

[10]Guttmann, H. Diphtherieheilserum und postdiphtheritische Accommodationslaehmung; Inauguraldissertation, Berlin, 1896.

[12]Janowski. Arch. f. Kinderheilk, 1896, No. 1 (on same subject matter as Guttmann).

MONOLATERAL CASES OF PARESIS AND PARALYSIS.

[1]Jeaffreson. *Med. Times and Gazette*, 1873, vol. xlvii, p. 89.

[2]Alexander. Ueber einseitige Accommodationslaehmung mit Mydriasis auf syphilitischer Basis; Berl. Med. Wochenschr., 1878, vol. xv, p. 302-306.

[3]Alexander. Ibidem: Deut. Med. Wochenschr.; 1881, vol. vll, p. 562.

[4]Kirmisson. Paralyse unilaterale de l'accommodation avec mydriase; Semaine Med., 1882, vol. 2, p. 193.

[5]Schapringer, A. A Case of Paresis of Accommodation with apparent Myopia (paresis on right side and partial spasm on the left); Arch. of Ophth. and Otol., vol. iv, p. 45, (1884).

[6]Hosch, F. Einseitige Accommodationsparese mit Mydriasis bei inveterirter Syphilis; Cor. Bl. f. schweiz. Aerzte, 1888, xvii.

[7]Hutchinson. Ophthalmoplegia Interna; Med. Chirurgical Trans., 1878. Cases of ataxia with monolateral paresis of accommodation.

[8]Sturge, W. Allen. Ophthalmoplegia (reports on Hutchinson's cases). Trans. of the Ophth. Soc. U. K., 1881, vol. 1, p. 165-187.

[9]Ferron. Unilateral Ophthalmoplegia Extrinsic or intrinsic from Vascular Lesions. Annales d'Oculistique, Nov., 1902.

[10]Panas. Amblyopia and Amaurosis from Electric Discharges; Archives d'Ophthalmologie, Oct., 1902. (Mentions unilateral paresis of accommodation).

[11]Mauthner. Lehre der Augenmuskellaehmung, p. 356. M. cites the case of the German author Heinrich Heine—a nuclear progressive paralysis.

DISCUSSION.

Dr. D. S. Reynolds, Louisville, Ky.—I regard this as one of the most important papers I have ever heard read. It opens up for discussion a many-sided question that has at times great clinical significance. Without undertaking to look into the theories discussed by the essayist, I wish to say that I regret he had overlooked the fact that some people have the voluntary power of controlling the pupillary motion and the accommodative function. Roget, of London, whose Treatise on Physiology was published in 1838, was able to dilate his pupil at will and control the exercise of the accommodation. He could go on reading the finest type and dilate the pupil widely or contract it at will. Benj. Travers, a distinguished ophthalmic surgeon of London, published a letter from Dr. Roget, in a Treatise on Ophthalmic Surgery, published in 1820-4, before the time the Physiology of Roget was published.

I am obliged to take issue with Dr. Suker when he says that, in the paralysis of accommodation in diphtheritic cases, the prognosis is always favorable. I know of more than one case of paralysis of accommodation occurring in the course of diphtheritic disease that has remained persistently for years, and it has not disappeared. I know an instance more than 20 years old; I mean it is more than 20 years since the diphtheria occurred in a child of ten. Of course it may be argued that the diphtheritic poison was not the sole cause of the paralysis, and it would be difficult to refute the argument, that other causes may have existed, but the fact remains, as tending to show that, the prognosis is not always favorable.

I have seen two persons, with congenital absence of the iris; in one there is no accommodative power, and in the other normal range of accommodation exists. These are not to be forgotten

nor overlooked. There are other cases in which absence of the function of accommodation exists, and which cannot be certainly accounted for.

I am very grateful to Dr. Suker for the time and care he has displayed in the preparation of this paper.

Dr. Adolf Alt, St. Louis.—While Dr. Reynolds mentions the fact that he has seen cases in which diphtheritic paralysis of the accommodation did not get better, I think the case he mentions as example was not an uncomplicated diphtheritic paralysis but probably some other disease was combined with the diphtheria. I have never seen such a paralysis that did not get well in the course of a number of weeks.

I beg to differ from Dr. Suker in his opinion that none but diphtheritic sore throats cause paralysis of accommodation. I have the records of a number of cases in which the bacteriological examination, the symptoms and the history of the case did not prove diphtheria, and in which a few weeks later paralysis of the accommodation occurred. I am satisfied that there are some infections of the tonsils and fauces that may cause paralysis of the accommodation which are not purely diphtheritic, or so little so that it is not possible to find the bacteriologic evidence and which, nevertheless, cause accommodative paralysis.

The Doctor recommends as treatment, palliative glasses. I do not see why we should give them. The accommodation assumes day by day a little more strength, and after a few days, you will have to get another glass, and at no time will it be of much value. I believe that the child who has diphtheritic paralysis should be carefully looked after, for fear of more important pareses and paralyses supervening. I have the children abstain from eye work and do not allow them to go back to school as the family physician frequently does. I tell the parents to watch them very carefully, and especially not to let them run about. Sometimes to make them more comfortable I contract the muscle of accommodation by using eserin and usually give nux vomica or some such nerve stimulant.

Dr. Fred. C. Hotz, Chicago.—While listening to Dr. Suker's paper I was struck by the different tendencies that to-day two essayists have presented. Dr. Alt tried to separate two distinct pathological conditions which so frequently have traveled together. He showed that there is one group of episcleral inflam-

mation in which the nodules appear upon the episclera, and another class of cases in which diffuse infiltration was present. If that distinction would be adopted, I think a good deal of discussion as to the merits and demerits of the treatment would be eliminated.

On the other hand, it seems to me, if I caught the drift of Dr. Suker's paper rightly, he applies the term of paresis and paralysis to a number of cases or conditions in which it is not proper. He speaks of paresis of the accommodation following diseases that exhaust the system—typhoid fever and others. It is true that after an exhaustive disease most people cannot use their eyes for close work very long; if they are presbyopes, not at all; but the question is, is it proper to speak of such conditions as paralysis? Paresis means simply a low grade of paralysis. Those people are unable to keep their eyes converged very long. I suppose we should speak of insufficient converging power. Paralysis, if I understand the term right, refers to the nerve—to a reduced or limited supply of nerve force to the muscle. After such diseases the nerve is all right, it seems to me. It is the muscle which cannot act under the same nerve stimulus. The muscles cannot maintain the work required of them with the nerve force applied. These people cannot walk very long either, but certainly no one speaks of their legs being paralyzed or paretic; and that is the point I want to bring out, that this paper would lead you to speak of paralysis or paresis of accommodation under conditions where no such thing has existed.

Dr. Adolf Alt, St. Louis.—It has just occurred to me that I forgot that I wanted to refer to those cases in which there is a congenital insufficiency of accommodation. Here the muscle of accommodation is not sufficiently strong to do the full work required of it. Such cases surely would come under a separate class, and cannot be spoken of as paretic or paralytic cases, although their range of accommodation is smaller than it should be. These cases I think the author of the paper did not refer to.

Dr. Thomas Faith, Chicago.—The doctor makes the statement that contraction of the pupil and accommodation are not associated actions, and while this may be true in a certain limited number of cases, it is not the case in the average normal eye, and our modern text books of physiology teach that they are associated actions.

Another point is the statement that the differential diagnosis between paresis and other affections of the accommodation can be made by taking the range of accommodation. This I do not believe, as the range of accommodation differs so much in the same individual at different times and in different individuals at the same time.

Dr. Wm. E. Gamble, Chicago.—The question of drugs producing paresis of accommodation has not been dwelt upon. I have lately had an experience which emphasizes the importance of the careful exclusion of drugs as an etiologic factor. A man came to me with paralysis of accommodation which had existed for several weeks. I went over the case carefully without finding any cause for the trouble. I, however, discovered he had been taking a drug for some weeks and asked him to return and bring to me his prescription. This showed that he had taken 1-96 of a grain of hydrobromate of hyocin every two hours. I advised him to discontinue it and in a few days the accommodation was better. I think we should inquire as to the drugs that have been taken in these cases.

Dr. J. P. Worrell, Terre Haute, Ind.—I have at the present time a lady patient who has a deficient range of accommodation on one side. She is unable to use her eyes for reading and sewing. I found the manifest hypermetropia was greater upon the side on which the near point was the more remote, but a careful study under mydriatics showed there was no difference in the refraction. When the total hypermetropia was corrected and the accommodation was restored the near point in the affected eye remained more remote than in the other eye. I have attempted to correct this disparity by giving a stronger glass for reading on that side. This plan has been successful in this case, but I would like to know what is the experience of the gentlemen in the use of reading glasses stronger on one side than the other in cases in which the refraction is the same. I feel like commending the views of Dr. Hotz as to the impropriety of calling this paralysis. The eye shows no evidence of paralytic changes. The condition may be one of diminished muscular power, or one of increased resistance to be overcome.

Dr. H. H. Brown, Chicago.—I have very much enjoyed the paper of Dr. Suker. I feel that Dr. Alt made a very important statement when he takes issue on the necessity of pharyngeal

involvement. I have a case, a daughter of a physician, a characteristic case, which came to me with complete paresis of the accommodation. She had been in school constantly until the time of isolation made necessary by the out-break of diphtheria in the family, at which time an adult member of the family died. The little girl was the picture of health and had no evidence of pharyngeal involvement. The paresis was as complete as any I have ever seen. The father being an intelligent physician, and the death of one member of the family giving every reason for care on his part, I am quite sure there was no pharyngeal involvement.

Dr. Edward B. Heckel, Pittsburg.—I wish to put myself on record as being of the same opinion as Dr. Alt, namely that a non-diphtheritic tonsilitis may be followed by a paralysis of accommodation. I have seen several cases where diphtheria could not be demonstrated. In seeking for a cause it is often difficult to arrive at a definite conclusion. In the use of drugs, as mentioned by Dr. Gamble, interesting problems arise. I once had a woman with a complete paralysis of accommodation without any apparent cause. She denied having used any drugs for a long time, but upon a closer inquiry I ascertained that she had been using a liniment on her husband. I obtained a copy of the prescription and found that it contained 2 dr. of fluid extract of Belladonna to a 3 oz. mixture. She had absorbed sufficient Belladonna through the skin of her hands to produce a paralysis of accommodation, which promptly disappeared after a discontinuance of the administration of the liniment. Paralysis not infrequently follows the use of a Belladonna plaster. I believe local paralyses are often due to a disturbance of the eliminative functions. In diabetics, I have seen a paralysis of the sixth nerve followed by a complete paralysis of all the third nerve muscles, and all of which made a complete recovery after the use of Carlsbad salt, which simply increased the eliminative functions and removed the toxic elements. The paralysis we see in hysteria, I believe are due to a faulty elimination, brought about by a physical disturbance of the normal functions and are toxic in character.

Dr. Adolf Alt.—Dr. Brown misunderstood me. I did not say I had ever seen paralysis of accommodation without pharyngeal involvement. I said that it is sometimes impossible to dis-

cover diphtheritic involvement in a sore throat. Yet a paralysis of the accommodation follows. Since the drug question has been brought up I wish to add an instance from my experience. A young gentleman rushed into my office with the exclamation: "O, Doctor, help me, I am going blind suddenly. If you cannot, I shall kill myself." After I had quieted him, I found he had paralysis of the sphincter pupillæ and ciliary muscle in both eyes. Careful inquiry finally elicited the fact that he had used a patent suppository which contained Belladonna for the cure of hæmorrhoids. The recovery was, of course, a speedy one.

Dr. Reynolds.—I would like Dr. Suker to give the distinction between *paresis,* which is central and *paralysis,* which is peripheral.

Dr. Suker (closing discussion).—I am not in the habit of taking issue with Dr. Brown, but I did say in my paper that it was not necessary to have diphtheria in the throat in order to have the paresis of accommodation, but that the diphtheria might be located anywhere. Although we might make 50 slides without demonstrating the bacillus, we still might have a mixed infection, or a diphtheritic involvement of very low grade. In such a case the bacillus might not assume its characteristic form. In reply to Dr. Hotz I will read a distinction I have made in a foot note, which will answer Dr. Reynolds at the same time. "Paralysis is the suspension or abolition of functional power, especially in the nervous system, in which case there is a temporary or permanent loss of the power of motion or sensation, or both, in the part supplied by the affected nerve. Paresis is an incomplete paralysis, especially when not associated with any demonstrable organic lesion—limited to motion and not to sensation." I said there were two varieties, myopathic and neuropathic. The myopathic can follow general muscular enfeeblement which usually happens in such diseases as typhoid, malaria, etc. In any muscle which is exhausted the effete materials accumulate and we have an exhaustion paresis. The nerve force may still be there, but the muscle incompetent to respond to the nerve impulse.

The reason our pupils are so near the nasal side is because we are creatures of evolution. If we live long enough we will find the pupil at the tip of the nose, as has once been said by my friend, Dr. Wood. The center or the muscle of accom-

modation is separate from the iris contraction center in the third nerve nucleus. Any one can by practice suspend the accommodation in one eye and maintain it in the other. My assistant has noticed it in my own accommodation, while using the ophthalmoscope. The same may be said of the iris motility. The main fact is that we have a separate center for the muscle of accommodation and the muscle for iris contraction in the third nerve nucleus. It has been proven that they are separate.

As to palliative glasses, I merely wish to help out and comfort the patient for the time being, as it may be a business man whom I want to tide over his difficulty.

The symptoms of a peripheral or central paralysis or paresis are practically the same. To determine whether it is a central or a peripheral lesion depends mainly upon the fact whether the act of accommodation alone is involved or whether it is associated with mydriasis or the involvement of other muscles supplied by the third nerve. If more than the accommodation is involved, excluding mydriatics, the chances are that there is a central lesion, for the simple reason that all these centers are so intimately connected that in a nuclear lesion it would be nigh to impossible for one to be affected and not the other.

FUSION TUBES AND THEIR USE FOR STRABISMUS.

BY EDWARD JACKSON, M. D.,

DENVER, COLORADO.

IN his Bowman lecture on the "Etiology and Educative Treatment of Convergent Strabismus" in 1898, Priestly Smith described the fusion tubes, and the different ways in which he employed them. The form which he called the "heteroscope," in which the two tubes are suspended in a kind of a hood, is convenient for measuring the amount of convergence or divergence. But for actual work in the educative treatment of strabismus it is not sufficiently flexible. It is not adapted to different widths between the pupils, and the movements that can be executed with it are only those of convergence and divergence.

There is some advantage in having the tubes adaptable to the distance between the pupils, and the patient takes more

interest in the exercises, and his interest continues longer when he is able to move the tubes with greater freedom. The exercises of fusing vertically displaced images, and rotated images, sometimes bear more directly on the deviation than do the exercises of divergence and convergence. Furthermore, these different exercises of fusion are of some value in all cases that require the developing of the fusion faculty.

For these reasons I have the tubes made, the one entirely independent of the other. One end of the tube is closed by a metal diaphragm, in which is a minute hole and a narrow slit. At the other end of the tube is placed a convex lens, having its principal focus at the diaphragm. One side of the tube is cut away or flattened, so that the slits can be brought almost together. This allows fusion when the normal axes converge to a point as close as three inches from the eyes. The tubes, as made by Paul Weis of Denver, are shown in the accompanying figure.

With these tubes a person with emmetropia, or corrected ametropia, holding one before each eye sees the hole as a light dot, and the slit as a light line, most distinctly without any effort of accommodation. When they are held with the flattened sides of the tubes toward each other, one who has the power of binocular fusion can fuse the two lines or the two dots, but cannot fuse both the lines and the dots at once. When a patient looks through them, if he sees only one dot and one line he is seeing with but one eye. If he sees two

dots and two lines, he is seeing with both eyes, but is not fusing the two images. If he sees one line and two dots, he is seeing with both eyes and fusing the images. He is exercising the power of normal binocular fusion. The same is true when one dot and two lines are seen. When the acuteness of vision is much better in one eye than in the other, the brightness of the line and dot seen by the better eye may be diminished by pasting over the hole and slit before that eye one or more thicknesses of paper.

In general the exercises begin by securing binocular fusion. When this has been done, so that the one line and two dots are seen, the tubes are moved as far as is possible without a separation of the images. That is, the power of fusion is made to guide and control the ocular movements. For a convergent strabismus the principal movement would be to diminish the convergence of the tubes. For divergent strabismus, to diminish their divergence. For vertical strabismus, to bring the tubes into the same plane. In each case the tubes are brought toward parallelism. For rotary deviation (cyclotropia), fusion would be obtained when the slit of the tube before the deviating eye is not parallel to the slit in the other tube. The movement then would be to bring the two slits toward parallelism.

But all these movements are valuable in training the power of binocular fusion and giving it control of the ocular movements, and this is a very important purpose of such exercises in all cases of strabismus, except those due to ocular paralysis occurring after the power of binocular fusion has been well established. Hence, in each case these various movements will all be of service. The tubes may also be very useful before any faculty of binocular fusion is developed. In teaching the child to see with both eyes at once, and to pay attention to the images which both furnish, the tubes may be turned so that the lines appear parallel in an oblique position, cross at right angles, join at the top or bottom, etc. Every combination in which images formed on the two retinas are in any way connected in the act of vision will prove of value. The variety and freedom of such exercises prevent them from becoming so quickly distasteful, as do the more fixed exercises of the amblyoscope and stereoscope.

THE TEACHING OF OPHTHALMOLOGY IN CHINA.

BY CHARLES A. OLIVER, A. M., M. D.,

PHILADELPHIA, PENN.

SEVERAL years ago, through the kindness of Dr. Joseph Price of this city, Dr. and Mrs. J. B. Fearn of Soochow, China, came under my tuition at the clinics of Wills' Hospital, in the eye wards at Philadelphia Hospital, and in one of my private classes. Dr. and Mrs. Fearn were at work with me daily for several months' time, and were earnest and painstaking students, acquiring a great deal of the theoretical knowledge which was so necessary for an adequate comprehension of their clinical findings, and becoming expert in much of the practical part of the work. They also gained a broad and comprehensive view of the literary portion of the subject through constant reading, and I felt sure that they returned to their home well equipped to practice and teach some of our Western ideas regarding the art and science of ophthalmology:

I received a few brief letters stating that the doctor and his wife had arrived at the field of their labors and had begun work, but it was not until a few days ago, when I received the following letter, had I any idea to what extent and to what good purpose they had applied their knowledge.

"Soochow, China, April 7th, 1903.

"DEAR DR. OLIVER:

"It has indeed been a long time since I have written you. We have been kept very busy this year. My fellow worker has gone home, and so Mrs. Fearn and I are by ourselves. We have had some very interesting cases.

"I suppose you know that we have a medical school in connection with our two hospitals, at which place we endeavor to teach the young men and women of China something of our healing art. Just at present I am trying to give them some idea of the eye and its diseases. We teach in English and Chinese both. The lecture is written in English, each student making a copy; it is then given in Chinese, the English being explained. All of our students are required to understand some English. We are raising the standard of our course each year. I send you the answers to my first

examination by one of the students; he gave us all of his in English. I am compelled to ask the questions in rather a round about way so that the students can understand. I want you to pass judgment upon this paper. You will see from the examination that I have not yet gotten to the consideration of diseases of the cornea, the iris and the deeper portions of the eye. This paper is just as the young man gave it to me. You will excuse his grammar, as he has never studied it as a special branch—only picking it up from his other studies. His idiom is rather poor in places. This part of the work is to me the most interesting. We have hopes of multiplying our good work by thus teaching others.

"I have to thank you for my knowledge of the practical work in ophthalmology. I never can forget how kind you were to me. I hope in some way to show this to you. I feel as though the best way to have you know my appreciation is to pass your teaching on to others. I wish you could visit us in our home here; we would give you some interesting eye clinics. I suppose you know that Dr. Mary Fitch is also in Soochow. I see her from time to time and we often speak of the evenings at your home. Dr. Jeffries is in Shanghai. He is now hard at work, which I am sure will bear good results, as he has had excellent preparation. I saw him some time ago for a short while. Unfortunately, however, we are so busy that we get but little time to seek any social life or pleasure.

"If you have time let me hear from you. Mrs. Fearn joins me in kindest regards.

"Sincerely,

J. B. Fearn."

The questions noted in the letter are as follows:

"Examination on the Eye, No. 1.

1. How does the blood reach the eye, and how does the blood leave the eye?

2. Name the tunics of the eye in order. Describe the cornea.

3. Describe the iris and the retina.

4. Describe the crystalline lens.

5. Describe the conjunctiva.

6. Describe the course of the tears.

7. Give symptoms and treatment of acute catarrhal conjunctivitis.

8. Give treatment and prophylaxis in purulent conjunctivitis.

9. Give treatment of injuries and burns of the eye.

10. What is the treatment of trachoma?

11. Give reasons for use of hot and cold compresses in eye diseases.''

The answers, with all the errors of construction, punctuation and spelling (being copied from the very sheets which were used by the student, Woo), although uncertain in many respects and capable of provoking much adverse criticism, are herewith given in every detail, in order that the reader may see to what a remarkable degree of certainty of knowledge the Chinese student of to-day has advanced.

''1. The blood supply the entire eye comes from the Ophthalmic Artery. This artery reach the eye through the most important opening, which is called the optic foramen. This foramen is at the apex of the bony cavity. The blood leave the eye from the Superior and Inferior Ophthalmic veins. These veins going out from the eye socket through the next important opening. which is called the superior orbital fissure.

''2. The tunics of the eye are three—1, Sclerotic and Cornea. 2, Choroid, Iris and Ciliary processes. 3, The Retina. The cornea is transparent projecting part of the external tunic of the eyeball. Its degree of curvature varies in different ages and people. It is more prominent in youth. The cornea is formed of four layers—1, Several strata of epithelial cells continuous with those of conjunctiva. 2, Cornea proper. 3, An elastic layer. 4, A single layer of epithelial cells. The third and fourth layers combined are called the membrane of Descemet. The cornea is nonvascular but is full of nerves.

''3. The iris are muscular circular curtains behind the cornea. It has a hole in its centre called the Pupil. The iris is very contractile. The iris suspended in the aqueous humor and forms the division of the anterior and posterior chambers. The iris are connected at its circumference to the

choroid and cornea. The iris at its pupillary margin is in contact with the crystalline lens, so it causes fastens to the lens in Iritis.

"Retina is a delicate nerve membrane, upon the surface of which the images of external objects are received. The retina is the outspreading ends of the optic nerve. Exactly back of the pupil, at the posterior surface of the retina, there is a round yellow spot, called yellow spot or Macula Lutea. At this point the sense of vision is most acute.

"4. The crystalline lens enclosed in its capsule just behind the iris. It is a transparent double convex body. In fœtus it is nearly round, but in adult life it becomes more flattened, and in old age it becomes quite flat. It is not so transparent in old age than in youth. The capsule of the lens fits close around the lens. The crystalline lens retained in its place by the suspensory ligament; the Hyloid membrane.

"5. Conjunctiva is the mucus membrane of the eye. It lines the inner surface of the lids and continuous onto the eyeball. It covers the anterior part of the cornea and sclerotic. The conjunctiva lines the inner surface of the lids are thick and very vascular and covered with numerous papillæ which cause hypertrophy in Trachoma. The part over the Sclerotic is thinner, and over the cornea is very thin. The conjunctiva over the Sclerotic is slight vascular in health. The nerves are numerous in conjunctiva.

"6. The tears secret from the lacrymal gland, this gland is at the outer upper angle of the eye and is in a depression. It secret the tears to keep the eye moist. After passing from the surface of the eye, it flows out through the punctum and into the lacrymal canal and on into the lacrymal sac and into the nasal duct and into the nasal cavity,

"7. Symptoms. Subject. 1, Increased lacrymation. 2, Photophobia. 3, Burning and itching. If there is pain, the cornea perhaps involved. The sensation of sand in eye is produced by flakes of mucus which swept over the sensitive cornea. The flakes of mucous often temporily obscure vision, all these symptoms are worse at night. Objective symptoms. 1, redness, relaxation, and swelling. 2, Increased of secretions with or without change in its character. The con-

gest is very great, is easily distinguished them one from another. These symptoms usually confined to the conjunctiva of Tarsi, and fornici, but in severe forms it involved the whole parts of the conjunctiva.

"Treatment. 1, Remove the cause. 2, Abort or control the attack. 3, Prevent it running into chronic form. Glasses should be fitted. The interior of the eye should be examined. Applications of silver nitrate solution, the strength is usually one per cent (5 grains to one ounce). This application should be preceded by a thorough washing of the conjunctival sac with a solution of Boracic Acid (10 grains to one ounce). Absorbant cotton wound upon an applicator and dipped into the solution, care having been taken to remove any excess of the solution from the swab. The lid everted and touched. The manner of application is even more important than the strength of the solution. If the eye be thoroughly clean a ten grain solution should be passed lightly two or three times with a cotton swab freshly charged each time. The effect is good. If done carelessly there is very little good. The immediate result of an application to the lid, is increasing of the symptoms. A slough form usually thrown off with half an hour or longer. Then it turns white which lasts a day and is followed by the stage of recrudence which is an indication of a fresh application. Silver should not be applied at night, for the lids are closed and the exudate does not escape but lying in the sac during the night and dry upon the lids and cause new trouble. It also should not apply too often as the inflammation will be increased. The inflammatory exudate present in the tissues underneath should thus be allowed to escape. When the severe symptoms subside, use boracic acid solution. If the cornea is broken, do not use lead solution. Peroxide of Hydrogen 25 per cent used as the same was as silver.

"8. Treatment. The most important point of the treatment is to washing away all the discharge from the eye, especially when the disease pass into the stage of purulent discharge. The most used for washing out the eye (in this trouble) a solution of Boracic acid. The object aimed at is not distruction the poison in the sac but to remove of the poison, so this solution is best. A rubber bulb with a glass

pipete is best instrument for washing out the eye. The point of glass pipete should very smooth and inserted at the outer canthus of the eye and forcing the cleansing solution to the sac. The bulb should hold as much as two ounces. After washing the pipete put in antiseptic solution to disinfect it.

"This washing should be every hour or as oftener as the discharge may demand. At the time the discharge cannot be washing away. Use a small bit of absorbant cotton, take away all the discharge without much wiping. If the swelling are so great, constantly applying of cloth wrung out with cold water. It is not good in weak patients and the eye should be watched very carefully in such cases. The cornea should be watched. If the cornea grows hazy the cold is does not fit for him should be stopped at once. The swelling grows less and the discharge very purulent, the cold is not of much use. If seen early the course may be cut short by an application of Silver Nitrate Solution. When during the periods of watery and the great intense of lids, the silver must not repeat. When the discharge is purulent a solution of 2-4 per cent of silver nitrate or a 20-40 per cent solution of protargol should be used. Everted the lids and apply on the surface of the conjunctiva, once a day or as the case indicate. Silver should not make the second application when the conjunctiva looks raw and red but wait till the conjunctiva assumes its succulent appearance. Canthotomy performed at the times of the lid are so swelling that it is impossible for a free cleansing or from pressure of lid so much. In child the upper lid may be divided.

"The general treatment is to rest on bed till the swelling and discharge begin to grow less. Internally begin with a dose of free laxative or cathartics, afterward give quinine or tincture of chloride of iron, the latter in full doses. If the patient weak or run down, other tonics or stimulants may be given as the case indicate. Prophylaxes—As important as treatment. For in adults usually but one eye is affected at first. The other eye should be with great care to prevent it from being infected. Use a pad of linen put over the lid, over this a pad of absorbant cotton, both held down by collodion paint around the edges, or use the adhesive plaster to

fasten the edge of these pads to the skin. The best way is to use a large watch glass put over the good eye and fasten the margins with strips of adhesive plaster. This way has been done, the patient can get about or examine the eye. A small opening left at the temporal side to allow the air to circulate. At birth usually both eyes are affected, but also should be prevented. When you think the child is infected, use a 2 per cent solution of Nitrate of Silver to clean the eye. It is so common, so is better washing out every new born baby with the Solution of Silver Nitrate. You should very careful to examine the eyes of every new born baby if there is an appearance of little redness.

"9. Treatment of Injury. Washing out the conjunctival sac to remove the foreign bodies from the eye and keep the eye clean until well. Burns of the eye may be treated by washing the conjunctival sac with milk. If burns by lime, be first wash the eye with oil, then a saturated solution of Sugar, one drop put into the eye. Cold compress relieve pain. It is hard to prevent symblepharon.

"10. No treatment seems to do much good in a great many cases. In the early stage before the granule developed sufficiently, to be sure of your diagnosis, an application of Silver nitrate may be used. When these granules can be seen as hidden under the thickened lid or the conjunctiva, the recovery may be quicker by mechanically pressing out these granules. This may be done by thumb nail, to catching the thickened lids or its inside between the two nails forcing out all the granules that can be removed from the tissue. Best instrument for this purpose is known as Knapp's roller forceps which will take away these granules quite nicely. An anæsthetic should be used in painful cases. In a few patients this treatment can be cured them without further treatment. But in large number of patients only hastens the recovery which should be brought about by a astringent applications faithfully applied as long as necessary. Remove these granules by scraping or cutting has been done, but this treatment usually leaves large scars and cause lid deformity. When there are few or no granules, the astringent application may be relied upon. The best drug for this astringent application is Copper Sulphate (Blue stone). In severe cases this appli-

cation should do every day but usually every second and third day will Do. Next the Sulphate of Copper is a solution of Tannin in glycerine (8 per cent. one drachm to a fluid ounce). It is more useful when the discharge grows less or the conjunctiva is smoother. It should be applied on the everted lids. A solution of iodine apply to the everted lids sometimes are good. A solution of 1-500 or even stronger of Bichloride of mercury may given relief but is very painful.

"For dispensary work when a patient is treated at home, a weak solution of Sulphate of Copper in glycerine (¼ or ⅛ of one per cent.) or (½-1 grain to the fluid ounce) or solution of tannin in glycerine are good remedies. When there is pannus or the granules are indolent, hot compresses form a fine stimulant. In addition to the strong application the eye should be kept clean. Use atropin when necessary. The present of any discharge use a weak solution of Bichloride of mercury or Solution of Boric Acid. If it becomes chronic see if the patient does not need glasses. If there is lid deformity an operation should be performed.

(Signed) LEE YOONG WOO."

Ignoring the way in which the answers are put (a mere question of language, and one in which many of our own students would be equally at fault in even modern French and German, let alone Chinese), I offer them as a sample of the effects of the good work which is being done by the medical men and women of our country who have voluntarily placed themselves in the midst of strange and, at times, uncertain people.

In this letter and its contents I find an illustration of the great service which is being rendered to another nation in lessening the amount of its ophthalmic diseases and in decreasing the number of its blind.

MEDICAL SOCIETIES.

PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.*

W. LANG, F.R.C.S., President, in the Chair.

Thursday, June 11th, 1903.

SUBCONJUNCTIVAL FISTULA FORMATION IN THE TREATMENT OF CHRONIC GLAUCOMA.

MAJOR HERBERT, I.M.S., described how this could be done either by producing a subconjunctival prolapse of the iris or by infolding the conjunctiva. The report dealt with 130 cases in which the iris was left prolapsed under a conjunctival flap, and in all but 18 eyes a small iridectomy was added. A large number of these eyes were in an advanced stage of the disease, and were therefore not very hopeful when an iridectomy only was done. For this reason a large incision was dangerous. The visual results of operations done from six months to upwards of three years previously were given. Only one eye had suffered from late infection, and this gave way rapidly to treatment. In two eyes there was iridocyclitis immediately following the operation. In one case it caused partial occlusion of the pupil, and in the other, which was somewhat neglected, it led to sympathetic ophthalmia, with total loss of both eyes. The sight of another was lost through protracted delay in filling of the anterior chamber. These serious early complications were less numerous than when simple iridectomy was done. It was claimed that a filtering cicatrix could be obtained with certainty, and that in some cases this was the only way to relieve the tension. At any rate, the risk was far less than if the tension was not relieved by the iridectomy. On the whole, the visual results were much better than could have been expected from typical iridectomy. Many cases of so-called atrophy of the optic nerve after operation were in reality due to unrelieved tension. A fistulous cicatrix was indicated (1) when iridectomy had already failed, (2) where it was likely to fail such as in ad-

*British Medical Journal.

vanced cases, and (3) when the patient was not expected to return for a second operation if one was required. The danger to the other eye was very remote and would probably yield to mercurial treatment or enucleation. The connection of the iris with the prolapse could, if desired, be severed by a subconjunctival sclerotomy, cutting up through the attached base of the iris. The second method by a subconjunctival infolding into a small sclerotomy wound had proved effective in a number of cases. The aim was to establish a fistula unconnected with the uveal tract. By a special suture the flap could be kept in place long enough to keep separate the lips of the wound so as to form a permanent subconjunctival fistulous track. The 10 cases in which this was done were of too recent date to give a correct appreciation of its value. Other successful cases of conjunctival infolding without suture had been under observation for periods up to nearly two years. Many other attempts, however, failed to relieve tension through the flap not remaining infolded long enough; and in one eye the tension was far too much reduced. Apparently infective mild iritis came on and eventually detachment of the retina. Twenty-three operations were performed without suture, or with imperfect suture.

Mr. Priestley Smith, Mr. Treacher Collins and Sir Anderson Critchett made remarks; and Major Herbert briefly replied.

Friday, July 3rd, 1903.

Keratitis, with Special Reference to the Part Played by the Corneal Cells.

Dr. Leslie Buchanan gave a lantern demonstration of sections of the cornea, showing the changes following injury and disease. Proliferation of corneal corpuscles appeared to take a larger share in the production of new cells than exudations from the vessels of the limbus. Sections of the normal cornea showed a more liberal distribution of corneal corpuscles in the anterior layers than in those further back. In inflamed areas budding of nuclei could be demonstrated, and this in advanced cases amounted to complete fragmentation of the original nucleus, the new nuclei being traceable

along channels between the corneal fibres, presumably in the course of lymph currents. In other instances fibrillation of the corneal fibres and separation of the elements by œdema was manifest.

Primary Papilloma of the Cornea.

Mr. C. W. Dean reported a case. After pointing out the extreme rarity of the condition, he stated that the patient was a fisherman, aged 53, who was first seen in August, 1901. There was a tumor growing from the inner side of the left cornea. It had existed for about four years, and had commenced as a minute speck on the "clear" part of the eye, and it had gradually grown, principally toward the pupil. On August 30th the growth was the size of a flattened pea, and whitish in appearance. It was situated at the lower and inner quadrant of the cornea, to which it was closely adherent. It slightly overlapped the conjunctiva. Some fine posterior synechiæ were present. Left vision was J. 14. Mr. Bickerton removed the tumor, and the patient made a rapid recovery. In November the vision was $^6/_6$ and J. 2. The examination of the tumor showed it to be a papilloma, with much heaping up of horny epidermis. The site of the tumor was now hardly visible.

Plexiform Neuroma (Elephantiasis Neuromatosa) of Temporal Region, Orbit, Eyelid and Eyeball.

Mr. Simeon Snell (Sheffield) related three cases:

The first was a lady aged 25, in which the deformity affected chiefly the right upper lid, but involved also the lower eyelid and the tissues of the temporal region. The condition was congenital, but had gradually increased. Considerable improvement in appearance was effected by removal of the much thickened tissue. Case II was a youth, aged 19. He had been first seen as a baby and again five years ago. The condition was congenital, and the deformity was very great and affected the left upper eyelid, the temporal region, and side of face and orbit. The mucous membrane of the left alveolus and left side of the palate was also implicated; the eyeball was shrunken and small. The orbit was greatly enlarged, and at its outer side was felt a thickened mass in the situation of the lachrymal gland. Two operations were per-

formed for removal of the thickened tissues from the orbit, eyelids and the integument of the temporo-facial region with considerable improvement in appearance. Case III was a boy, aged 7. The condition affected the left eyelids, the temporal region and the orbit; the eye was buphthalmic. It was congenital, but had gradually increased, especially latterly. The globe was enucleated, and on two occasions large portions of the thickened tissues were excised. In all three cases the tissues were dense and contained numerous cells and thick threads. Bleeding was very free.

The histological examination of the second and third cases was presented by Mr. Treacher Collins. He had found that the skin in both cases showed thickening of the corium but no inflammatory infiltration. In the subcutaneous tissue numerous sections of nerves were seen cut in various directions; there was marked thickening of the connective tissue elements in both perineurium and endoneurium. Sections stained by Weigert's method showed the nerve fibres in the center of these masses of thickened fibrous tissue. Examination of the buphthalmic eye from the third case showed enlargement and thickening of the fibrous tissue of the nerves, external to the sclerotic, and lying in the sclerotic. The nerves of the cornea and uveal tract were enlarged, and there was a congenital adhesion of the iris to the cornea, with a failure in development of the ligamentum pectinatum. This accounted for the increased tension and subsequent enlargement of the globe.

Mr. Snell remarked that the literature of the cases was not very extensive. He referred to Alexis Thomson's monograph in which 58 cases of plexiform neuroma in different parts of the body were collected. Out of this number were 18 in which the eyelids, forehead and temple were affected, but there was no reference to implication of the orbit.

Card Specimens.

The following were shown: Dr. Leslie Buchanan: (1) A specimen of an eye which was quite healthy previous to an injury ten weeks before but which then suppurated, and on removal contained bone in the shrivelled stump; (2) a case of keratomycosis. Messrs. W. C. Rockliffe and L. H. Parsons: Plexiform neuroma.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

SOME TYPES OF RETINITIS AND CHORIO-RETINTIS.

Alexander Duane (*Medical News*, March 21) discusses the following types:

1. *Exudative Chorio-retinitis.*—Occurring, usually in young people and often without apparent cause, acute onset, running a rapid course, marked by the presence of single, circumscribed exudate situated, usually, not very far from the optic disc, often associated with considerable edema and milkiness of the surrounding retina, and impairment of vision if the exudate is located in region of the macula. The salicylates, calomel in broken doses and rest in bed seems to be the best treatment. The prognosis is generally favorable.

2. *Plastic Chorio-retinitis.*—Characterized by sharply defined whitish aggregations of connective tissue, which may be sunk in the choroid or retina, or may project into the vitreous, even as far as the lens or the ciliary body; attributable to organization taking place in the vitreous exudate. This may develop in conjunction with disseminated choroiditis or may accompany a retinitis, in which case they often originate in a patch of hemorrhage. At times they probably occur as a result of a hemorrhage without inflammation of either the choroid or the retina. These plastic products are apt to remain unchanged for years, though the milder forms may be capable of absorption. Mercury and the iodides seem to be the best treatment. The second form mentioned is retinitis circinata, of which the author reports an atypical case.

THE GIANT MAGNET IN OPHTHALMIC SURGERY.

Leartus Conner (*The Journal of the American Medical Association*, March, 21) reports two cases in which the giant magnet was successfully used, in one of which a *small* magnet had failed. Both cases recovered with some vision and a slightly disfigured eye. The author feels that had it not been

for the giant magnet an enucleation would have been necessary in both cases. He says:

"The technique of extraction of splinters from the vitreous chamber is far from being as simple as might appear. The most experienced are still learning, and beginners do well to heed their suggestions. The great power of the giant magnet renders it capable of irreparable harm if wrongly directed, or infinite good if rightly.

"The experimental work, added to the clinical evidence of numerous observers, combines to show that at contact and up to two mm. the power of the small magnet equals, if not surpasses, the giant, but from this distance to 10 mm. the power of the giant increases in almost geometric ratio. From this fact it is clear that the small magnet is suited only to such cases as admit of its point being brought in direct contact with the splinter, while the remaining cases are clearly within the domain of the giant magnet. Under this view of the case most, if not all, splinters in the vitreous should be extracted with the giant magnet, and not a few in the aqueous chamber.

"Experiment and observation show that the farther the magnet is from the splinter the more uniform the action of its force, and the nearer the more jerky such force—the stronger the magnet the more marked this law. It follows that in practice it is wise to either (1) bring the eye close to the magnet point ere starting the current and increase its power very slowly, or (2) bring the eye from a considerable distance toward the point of the magnet with full current very gradually. The jerky force is liable to draw the splinter into the ciliary body, whence it is removed with difficulty, if at all, or it may draw it into some other undesirable location. To rectify this state of the splinter Dr. Kipp has shown us how to utilize the other tip of the magnet to repel the splinter from its misadventure, or course; this calls for a double-ended magnet. In his case the splinter fixed itself firmly in the ciliary body, and no change in direction of the magnetic force would dislodge it. He reversed the pole, when the splinter was released and readily removed. Possibly had this fact been known many failures would have been avoided, as even Haab reports failure from this cause.

"Haab so places his magnet that the force shall pass directly through the center of the cornea, expecting the splinter to approach the posterior pole of the lens, curve around its posterior surface, penetrate the suspensory ligament, enter aqueous chamber, pass between the posterior surface of the iris and anterior surface of lens to the pupillary opening, whence it is extracted by a conveniently located corneal incision. In cases like those reported, where the wound in the cornea is large and freshly made, a new corneal incision is superfluous and the placing of the magnetic current over the fresh wound more desirable. Doubtless other cases will make it desirable to depart from Haab's rule.

"Since 1892 to June, 1902, Haab reports 165 operations with the giant magnet. Of these 23 failed; 39 eyes were enucleated; 9 had lingering cyclitis; 19 were saved from inflammation, but were sightless. Of 71 cataracts extracted, 51 had good vision.

"His failure to extract the foreign body he lays to four causes: 1. A firm fixation of the splinter in the posterior wall of the eyeball (emphasis to be placed on the "firm," as in other cases the splinter was extracted from the same location); 2. firm fixation of the splinter in the ciliary body; 3. splinter held by a fibrinous exudate; 4. a splinter healed over in the lapse of months."

TRICHLORACETIC ACID TREATMENT OF INFECTIVE ULCERS OF THE CORNEA.

Albert E. Bulson, Jr. (*Ophthalmic Record*, February) reports two cases. He thinks that in ulcer of the cornea, no matter what the character of the infection, treatment with trichloracetic acid is superior to pure carbolic acid or any other caustic with which he is familiar, and is much safer than the thermo or galvano cautery.

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ORIGINAL ARTICLES.

BLEPHARITIS MARGINALIS.*

By DUDLEY S. REYNOLDS, A.M.M.D.,
LOUISVILLE. KY.

ONE of the commonest forms of blepharitis marginalis, seen in persons of every rank and station in life, and of all ages, is that in which there is slight thickening of the borders of the lids. The anterior margins are dry and red, and the lash, on close inspection, is observed to be thin, whilst the cuticle between the hairs is covered with minute scales of desquamating epidermis. This condition seems aggravated by constipated bowels, by the loss of sleep, and by fatigue of any kind. For convenience I will designate this class A. Cases of this kind are frequently observed to almost entirely disappear under correction of errors of refraction, of intestinal constipation, and of any form of mal-nutrition, or debility; whilst, on the recurrence of any of these abnormal conditions, or the use of the ametropic eyes without glasses, the local affection in the margin of the lids reappears. This is a condition that seems to be least susceptible to the action of any of the mercurial ointments. In fact, the fungus present in the hair follicles seems incapable of producing much thickening and excoriation until some hyperæmia is set up, then the blepharitis takes on active symptoms. In cases seemingly cured by correcting errors of refraction, etc., close inspection will disclose a small, sheath-like elevation of epidermis around

*Read before The American Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 10, 1903.

each hair in the lash. I believe the fungus in the follicles in such cases may be entirely eradicated, and permanent recovery secured for many of them, by the periodical application of pure carbolic acid. I apply it with a needle, first preparing the acid by adding about ten minims of alcohol to the drachm of crystalized acid, and agitating sufficiently to dissolve all crystals. This will usually remain in liquid form as long as it is kept in a well-stopped vessel. Into this fluid I dip the point of the needle, and, holding the lid firmly with the fingers of the other hand, I scrape off all the detachable scales between the lash, making the application as nearly direct and complete to all the hair follicles of the margin of the lid as possible. By repeatedly dipping the needle into the acid, and scraping the skin, taking care that none shall be allowed to run over the free border, the application can be made so thorough and complete as to whiten all that portion of the skin containing the lash. This creates a little temporary smarting, which is not severe, and which lasts not more than two or three minutes. About the fifth day after each of these treatments a crust of epidermis exfoliates, and should be removed, and a little yellow oxide of mercury ointment applied. The application of the carbolic acid should be repeated about once in ten days, in ordinary cases. In the course of about three months, it will be observed in most cases, especially in young persons, that a heavy and luxurious growth of lash has come on, and with it entire disappearance of all the manifestations of blepharitis. I have observed that most of these cases seem permanently cured, after a lapse of five or ten years.

As an illustration of the intractable nature of this disease, I invite attention to the case of Miss D., aged 13, who came to me August 22, 1899. The margins of the lids of both eyes were slightly thicker than normal. On close inspection it was observed that the anterior margins were covered with fine scales of desquamating epidermis. There were no signs of hair where the lash should be in either of the upper lids, and but a few fine, short hairs along the margins of the lower lids, and these were scattered at long intervals. She had for two years been under the constant treatment of eminent specialists, and had been told by one of my ablest confreres that she would never again have any lash. The family were

anxious, and I felt the necessity of being cautious about making a prognosis. I asked for two weeks time in which to form an opinion as to the probability of a re-growth of lash. I applied the phenol in the manner described, to the right upper and lower lids. She was unwilling to have the application made to the other eye at this time, so we had to wait; meantime using the yellow oxide of mercury ointment to the left eye, with friction, once every day. August 25th the crust exfoliated from the lids of the right eye, and the yellow oxide or mercury was applied, with friction, with the edge of a Daviel spoon. At the end of a week from the date of the first treatment a magnifying glass disclosed evidences of the return of a few lashes, and I made an encouraging prognosis as to the right eye. The left, which showed no signs of improvement, was then subjected to similar treatment.

During the fall I was permitted to apply one more treatment of this kind to each eye, and before Christmas she had a good growth of rather heavy lashes, with almost total disappearance of the itching of the lids and roughness of cuticle, which had greatly annoyed her for months before she came to me.

In the spring of 1890 I did not see her. About the first of June the lash suddenly fell out. She returned, and at intervals during the summer of 1900 she received treatment with the phenol, and soon enjoyed a luxurious growth of lash, which was the envy of all the girls in her school.

In September, 1901, it was thought the upper lash looked thin, so I applied the phenol to both eyes. The lash became more luxuriant, and no further trouble came until September, 1902, when, the patient having gone to Cincinnati to live, wrote me her lashes had again fallen out. I referred her to Dr. Derrick T. Vail, and do not know how she is since.

(B.) The cases which present an excoriated, glazed, red, rounded appearance of the tarsal margin, with no sign of lash, are seldom seen with both eyes affected to the same degree. It often happens that one eye may be placed in class A, whilst the other presents an aggravated condition, with a tendency to fissure at the external canthus. Constitutional disturbances and errors of refraction are alike provocative of aggravated symptoms in these cases. I have never observed much relief from

local treatment with ointments; and, for that matter, nothing approximating curative results from any sort of treatment, excepting the phenol, applied as described in class A. I have frequently observed, where the lid is very greatly thickened, the margin rounded off, and of a bright red, glazed appearance, absolutely free from any sign of lash, after two or three applications of the phenol, at intervals of ten days, great reduction in the thickening of the lid is secured, and a fair growth of lash begins to appear; and, by the continued prosecution of this plan of treatment, with constitutional correctives, absolutely complete recovery occurs in many persons under forty years of age, It is especially efficacious in children, who are always averse to systematic rules for applying ointments.

(C.) Another class of cases is that in which an abuudant accumulation of inspissated sebum mats the lash together in groups. When the crust is removed it is usual for most of the hairs of the lash to come away with it, disclosing an ulcerated condition of the lid, which destroys the hair follicles. This condition is sometimes associated with great thickening of the margin of the lid, and dilated veins are often seen coursing over the surface of the lid, just under the skin. On everting the lid, a relaxed and flabby condition of the retrotarsal conjunctiva appears. There is profuse lacrimation, and sometimes photophobia. The crust is best removed, after an application of simple petrolatum, with a cotton mop, made by rolling a bit of cotton on the end of a probe, and dipping it into the ointment, and smearing the lids in contact with the upper boundary of the lash. After a little rubbing with this mop, the crust becomes loosened at the upper edge and may be lifted off with the dressing forceps, or turned out with the end of a small probe. The ulcer, which is sometimes deep and of a conical form, should now be cleansed by pressing into it a clean cotton mop; and, after removing all the moisture, a small portion of phenol should be applied to the bottom of the ulcer. Keeping the lid separated to prevent any flow of tears carrying the phenol between the lids, it will soon be observed that the whitening produced by the phenol has disappeared by becoming incorporated with the tissues. The patient may now have a piece of gauze, smeared with

petrolatum, laid over the closed lids, and a bit of cotton wool on the outside of the gauze, secured with a few strips of plaster, laid from the cheek to the forehead. This dressing should not be disturbed for twenty-four hours, when the treatment may be repeated, if necessary, as at first, excepting that it will be observed no crust has reappeared in the lash, and therefore no preliminary treatment is required. The ulcer, however, should be carefully dried and again treated to an application of the phenol. In some cases a single treatment will be found sufficient to cure the ulceration. By this plan of treatment some of the worst cases may be entirely cured within ten days. Always bear in mind, however, the necessity for close attention to constitutional correctives.

There are many cases of ulcerative blepharitis marginalis that are undoubtedly due to inherited syphilis, and no plan of local treatment, unassociated with constitutional measures, will be found availing. The syrup of hydriodic acid is a priceless remedy in such cases, and may be given with the food to children of all ages, without risk of disturbing the gastro-intestinal system.

It should not be forgotten that most of the ulcers in this class of cases are broken-down gummatous formations. It is sometimes seen in the ciliary margin of the lids, and sometimes in the meibomian margin. In this class of cases the ulcer should be thoroughly dried, and the ulcer filled with a portion of yellow oxide of mercury powder, or a crystal of the red oxide.

There are cases, however, in which a minute pustule occupies a single hair follicle, or several contiguous follicles, but these cases are so distinct in appearance and so easily recognized by the unaided eye, as to make the diagnosis certain. It is often seen that a single hair is surrounded by a yellowish white opaque substance, which, when the hair is pulled out, is found adhering to it. Fortunately, this infectious folliculitis of the ciliary margin of the eyelid is not very common, as it invariably destroys the hair bulb in each infected follicle. Bathing the eye in a solution of chloride of sodium, fifteen grains to the ounce of water, quickly terminates this infection.

There are many complicated forms of ulcerated blepharitis marginalis, each of which require distinct modifications of

local treatment, and so I do not wish to be understood as claiming that the local application of phenol is to be indiscriminatingly made. It is certain it could not suffice in cases of tarso-adenitis; nor in those cases where the cicatricial contractions from previous ulceration may have obliterated the hair follicles. It would be useless in mal-position of the puncta lacrimalia, nor would it be found sufficient in cases complicated with phlyctenular disease.

The condition in which alopecia is present, without ulceration or apparent desquamating conditions, or which may be due to parasitic or microphitic causes, in persons who have neither syphilis nor leprosy, the application of phenol often produces brilliant results. I have never seen hair restored in a case of palpebral alopecia, the subject of general alopecia. In syphilitic subjects, where the hair has fallen from the brow, eyelids and head, all efforts at restoring it to the lids by local applications have failed in my hands, nor have I seen the lash reappear in syphilitic cases under any form of constitutional treatment.

Not attempting to exhaust the subject, I have endeavored to portray a few well-known conditions wherein the modifications of local treatment I have suggested seem more advantageous than the methods hitherto employed or commended by our standard authors.

DISCUSSION.

Dr. Vail.—Since my name has been mentioned in Dr. Reynolds' interesting paper, I shall report concerning the case referred to and which Dr. Reynolds kindly sent to me. The girl came in, presenting a letter of introduction. I saw the lashes had fallen from the left eye. At a glance there seemed to be no inflammation at all, but on close inspection I recognized there was some exfoliation of the epithelium, and on drawing out one or two of the few remaining hairs, I found the characteristic black-rooted and club-shaped appearance we have all seen in diseased lashes. I sterilized the margin of the lid with $H_2 O_2$ and applied 20 per cent. silver nitrate by means of a cotton tipped probe. The lashes promptly returned. At this time the young lady has the beautiful drooping lashes described by the writers of novels. The healthy appearance remains to the present day.

I have been able to recognize clinically several different types of blepharitis, all of which are manifested in both the acute and chronic forms: (1) simple, (2) pustular, (3) eczematous, (4) membranous (which is exceedingly violent; I have seen a membrane like diphtheria in the lashes, in most cases failed to find the germ, although in one case I did find the Klebs-Loeffler bacillus), (5) deciduous (to which the case reported by Dr. Reynolds belongs), (6) ulcerated, (7) tineal (Lousey). The same remedies cannot be used successfully in all cases.

Dr. Suker.—I wish to find fault with the term "marginal blepharitis." The name "blepharitis eczematosa" would cover the ground more fully. The loss of the lashes and thickening of the tarsus are secondary considerations. I am glad the author said not every case is due to refractive error, as we almost had to believe according to Roosa (1876), although I think many cases are hypermetropic. I am in the habit of using silver nitrate, 20 to 30 per cent., the same as the author uses the phenol, and with good results. The removal of the little coverings along the lashes, upon which the doctor laid stress, is a good point, though often neglected. In some cases ichthyol ointment acts admirably.

Dr. Heckel.—It seems to me we might eliminate the word "marginalis" altogether. The word "blepharitis" means an inflammation of the *lid*, but by common consent and usage it is limited to an inflammation at the margin of the lid, hence the modifying adjective "marginalis" is entirely superfluous. I think Dr. Suker misquoted himself when he said that he uses silver nitrate in a solution from 20 to 30 per cent. Did he not mean 20 to 30 grains to the ounce?

Dr. Alt.—I am in the habit of using corrosive sublimate in the same way as Dr. Reynolds uses the phenol, and am very much pleased with the results. Having cleansed and treated the lid margins with the bichloride of mercury, I apply an ointment for protection.

Dr. Hotz.—I fully agree with Dr. Reynolds that the use of ointments in the ulcerative forms is useless. In that form the application of nitrate of silver 10 to 20 per cent. or more, or carbolic acid as described, gives the best results. I was surprised to hear such a poor opinion about the efficacy

of ointment in that mild form, so-called squamous blepharitis. I found the careful use of ointment of yellow oxide of mercury or ointment of ichthyol and vaseline bring good results, if properly applied. The patient cannot do it himself. The ointment in the hands of the patient will never relieve his trouble, because it is impossible for him to make the application properly along the upper lid margin. It would be very difficult for me to do it myself to my own eye. You must instruct some one in the proper application of the ointment to the patient's eye. In the case of children, show the mother; if adults, show some other person, or have them come to you and do it yourself. I have made the experiment so frequently that I am satisfied it is the way the ointments are applied that makes the difference in the results. I have had them come back in a week or two without change in the condition, and then I applied it myself twice, perhaps, and there was such a manifest change in the condition that the patient himself expressed relief.

Dr. J. W. Murphy, Cincinnati.—I think Dr. Heckel is wrong when he says it should be 20 to 30 grains of nitrate of silver to the ounce, in these cases. I use 20 to 30 per cent. silver. It is necessary to use this strong solution; after carefully cleansing the lid margin, with its use you thoroughly destroy the ulcer, and a healthy result goes forward. With the weaker solutions, 4 or 5 per cent., you will hot have success.

Dr. Dayton.—I have a case in mind that might possibly account for the loss of those beautiful lashes. A girl of about the same age as Dr. Reynolds' case presented herself for treatment. I made a snap-shot diagnosis of blepharitis marginalis, but inasmuch as there was no perceptible inflammation present along the margin and no nlcers, I made an examination and found no disease of any of the follicles so far as I could see. I gave the yellow ointment with a very small amount of citrine ointment with it. She reported in a few days with no different appearance. I found on close questioning that she was apt to pull out hairs occasionally. I had her watched carefully for some time and not allowed to sleep by herself or be alone at all, and soon she had a very fine growth of lashes. She went on a visit away from home,

but this visit was brought to an abrupt termination because of the renewed loss of the lashes. She was again put under surveillance, without treatment, and the result was a return of the lashes. One day I took her privately and gave her a very good talking to, and she confessed to me that she had pulled out her lashes. It was a hysterical manifestation at the age of puberty and she had deliberately plucked every lash as it appeared in the upper lid. Perhaps the author's case is of the same character.

Dr. Vail.—This matter of an hysterical element was thoroughly gone over in the case reported. I sent for the mother, as I suspected hysteria, and explained to her in a kind way that it was possible that this young girl—who did not seem to be hysterical but unusually sensible about everything—might possibly be pulling out her lashes, and requested that she watch her closely. She never lost sight of her for a week and came back with the patient, declaring that there had been absolutely no interference. The lashes simply came away without any resistance and with none of the evidence of pain a patient gives when you draw a healthy lash. I am certain that this is not an hysterical case. I have met such cases, but do not believe this is one.

Dr. M. D. Stevenson, Akron, O.—When the borders of the lids are diseased it is necessary first to cleanse them thoroughly, removing all crusts and scales when present in order to learn their exact condition. Frequently the cleansed lids are found to be merely reddened (a vascular condition usually due to asthenopia) and not truly inflamed, the crusts and scales being the result of hypersecretion of the local glands and desquamation of epithelial cells. Many lids are found to be truly inflamed and some to have little pustules at the roots of the lashes involving the sebaceous glands. These particlar lashes should be epilated and the ulcers touched with a 20 to 30 per cent. silver nitrate solution. A mild, clean ointment kept in collapsible tubes, applied by a clean finger to the cleansed lids, is of great service, softening and at the same time facilitating the removal of the scales and crusts, keeping the orifices of the local glands patent and protecting the skin from the tears. Too often ointments are prescribed in common jars, allowing them to become dirty and rancid,

and the patient is not sufficiently impressed with the need of cleanliness in their application. A dirty, rancid ointment applied by foul fingers to unclean lids, is more productive of harm than good.

Dr. Reynolds (closing discussion).—I am thankful for the discussion the gentlemen have bestowed upon my feeble effort. As to the classification, I confess it was not meant to be scientific, but rather commonplace and clinical.

As to the possibilities of hysteria in the case I referred to Dr. Vail, I used the magnifying glass in the inspection of the ciliary margin of the lid, and finding no young lashes present, as would be the case had they been pulled out by force, I eliminated in that way the possibility of hysteria as an ætiological element. If the lash is plucked out with the finger nails, it is impossible to get all the young hairs. It is not possible for the patient to grasp them with the nails. The lid was absolutely bare, in this case, a complete madarosis.

As to the nitrate of silver, bichloride of mercury or any other form of caustic, I can conceive of no material difference in the result. The difference is simply as to preference on account of pain in the one case and its absence in the other. While the chemist may tell you that a little alcohol destroys carbolic acid, mixed as I mix it, it answers every purpose. I should hate very much to swallow alcohol containing carbolic acid in solution under the impression it had been destroyed. It is like a good many other things that chemistry teaches us—it may be hypothetically true, but in fact it is not true.

As for the treatment of any form of blepharitis with ointments, I fully concur with the gentleman who says it is necessary for the surgeon to apply them. The mother of this young lady was trained how to apply the ointment by means of a bit of cotton rolled on a stiff wire. As to the use of the solutions of nitrate of silver, I see difficulty in preventing this running over the border of the lid. The carbolic acid can be applied to a restricted area without risk of spreading. The pain it produces is very light and transitory, whilst silver and mercury produce burning pain which persists for an hour or more.

A SERIES OF GLAUCOMA CASES.*

BY DR. GEORGE F. FISKE.

CHICAGO, ILL.

No.	Name	Sex	Age	Eye	Refraction	Diagnosis and Operation.	Result.
1	A. G.	M	49	O. U.	+2 D.sph	Iridectomy O. U.	V=20/30, no recurrence.
2	Mrs. L. C.	F	55	O. S.	•	Traumatic glaucoma; Eviscer-atio bulbi	Right eye remains normal.
3	Mr. W.	M	48	O. U.	+3 D.	Irid. O. U.	No recurrence.
4	H. B.	M	41	O. D.	Em.	O. D. acute glaucoma, iridectomy	V=20/20, no recurrence.
5	Mrs.M.A.Mc	F	76	O. U.	Hyp. ast.	O. U. glaucoma simplex, O. U. Irid.	No recurrence.
6	Mrs. M. R.	F	70	O. D.	?	O. D. hæm. glau. irid. and evis. bulbi	Left eye remains normal.
7	Mrs. E. F.	F		O. D.	+4 D.	Glau. acute irid.	No recurrence.
8	A. J. B.	M	43	O. D.		Glau. chron. irid. 3 times and evis.	O. S. remains normal.
9	A. S.	M	60	O. D.		Glau. simplex chron. irid., later evis.	O. S. remains normal.
10	Mrs. M. S.	F		O. U.	+150	Glau. chron. irid. O. U.	O. D. 20/60, no recurrence.
11	Mrs. M. W.	F		O. U.		Glau. chron. O. U. irid.	Fingers at 2-4 feet.
12	Mrs. G. W.	F	47	O. S.	+250 D.	Glau. chron. irid. O. S.	O.D. remains normal.
13	Mrs. W. G.	F	60	O. U.	+150 D.	Glau. chron. O. U. irid.	O. S. V. =4/30.
14	Mrs. B.	M		O. D.		Glau. chron. irid. O. D.	O. S remains normal.
15	Mrs. W. J. W.	F	34	O. U.		Glau. chron. O. D. evis. O. S. irid.	O. S. fingers at 1-2 feet.
16	A. D.	M		O. S.	+150 D.	Glau. acute O. S. irid.	Right eye normal, O. S. 5/6, no recurrence.
17	W. C. P.	M	58	O. D.	Hyp.	Glau. chron. O. D. irid.	O. S. normal.
18	Mrs. D.	F	60	O. U.		Glau. acute O. U. irid.	No recurrence, V.=20/40.
19	Mrs. E. P. B.	F	63	O. D.	+450	Glau. chron. O. D. irid.	O. S. remains normal.
20	J. F. W.	M		O. D.	Em.	Glau. acute O. D. irid.	V.=20/30, No recurrence.
21	Mrs. L. Mc.	F	73	O. D.		Glau. chron. irid by Dr. Knapp	Eye blind, no recurrence.
22	B. C. D.	M	39	O. U.	+450 D.	Glau. sub acute O. U. irid.	V.=5/6, no recurrence.
23	Miss M. K.	F	30	O. D.	+1 D.	Glau. chron. O. D. irid.	No vision, O. S. remains normal.
24	Mrs. J. T.	F	42	O. D.	+1 D.	Glau. chron. O. D. irid. twice	O. D. no vision. O.S. Irid. advised.

*Read before The American Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 10, 1903.

No.	Name	Sex	Age	Eye	Refraction	Diagnosis and Operation	Result
25	W. M. E.	M	60	O. S.	+1 D. cyl	O. S. Glau. acute irid. O. D. Glau. acute O. D. irid. 4 yrs later	O. S. V.=5/6. O. D. V.=20/40.
26	D. J. H.	M	60	O. S.		Glau. acute O. S. irid.	No recurrence O. S., O. D. blind years ago following Gl.
27	H. A. O.	M	53	O. S.	+1 D.	Glau. subacute O. S. irid.	V.=5/10, operation advised, O. D. later.
28	Mrs. H. B. A.	F	66	O. S.	+2 D.	Glau. simplex irid.	No recurrence V. =20/120.
29	J. H. W.	M	58	O. S.	+150 D.	Glau. hæm. irid. and evis.	O. D. remains normal.
30	Mrs. J. H. E.	F	30	O. S.		Glau. acute slight attack, no operation	Eye normal.
31	W. H. J.	M	39	O. U.	+1 D.	O. D. glau. acute O. S. glau. chron. O. U. irid.	O. D. V.=5/5. O. S. V.=20/80.
32	Mrs. L. B.	F	66	O. S.		Glau. chron. O. S. irid.	No central vision O. D. remains normal.
33	R. P. F.	M	58	O. U.	Hyp.	Glau. acute O. U. irid.	V.=20/80, no recurrence.
34	J. B.	M	62	O. D.		Glau. acute irid.	V.=20/40.
35	N. S. H.	M				Glau. chron. irid.	O. U. blind, evis. may be necessary.

THESE thirty-six cases have been collated for the sake of making a few deductions, more or less authorized, and bringing up for discussion some practical questions connected with this disease, which is certainly to be dreaded by all of us.

As I understand it, the ætiology of glaucoma is still, after a great amount of research and discussion, by no means satisfactorily settled. It is perhaps fair to say that the symptoms can be best explained as due to an increase of tension, in its turn due to difficulty of excretion as compared with secretion. This being granted, the point to determine is the cause of this difficulty of excretion. In these cases of mine, there is not a single one of glaucoma in a myopic eye, and almost all the eyes are hyperopic. This corresponds with observations of other ophthalmologists, and careful measurements made by other observers all point to the small eye as being the one peculiarly liable to the disease. It seems to me, then, that the best explanation is that of Weber and Priestly Smith, which attributes the difficulty of excretion to the small eye and lens of normal size, that is, large in proportion.

In these eyes the ciliary body is enlarged and the flow of the lymph from the vitreous into the posterior chamber is hindered. When the veins of the ciliary body become too full, the swelling cuts off communication between the vitreous and the posterior chamber and the ciliary body is pushed forward and presses the root of the iris against the sclera at the point of union with the cornea.

This question of the ætiology I have gone into at some length because it brings us logically to the question of what to do in glaucoma, and I believe in and wish to advocate the early iridectomy in all cases of glaucoma; this iridectomy to be followed by a second and third, if necessary, immediately the symptoms return.

It may seem an apology is due you for bringing up an old matter, and you may say, "We all of us believe in and practice iridectomy for our glaucoma cases."[2] My experience has been, however, that many of our best ophthalmologists resort to massage, and eserine, and heat, and procrastination with their patients in the early stages, at the time of the first attack; and it is right here that the operation is most useful and most likely to conserve the sight.

Then comes the question as to the operation upon the second eye. As we all know, in the majority of cases the second eye is sooner or later affected by the disease. I remember hearing a brilliant paper on this subject where it was advised that an iridectomy should be performed upon the second eye, even when sound and when no symptoms of the disease had presented themselves. Personally I believe that it is quite demonstrable that such a course would save many from blindness, though I doubt if any of you will here advocate such a procedure, and this is one of the questions I wish to bring up for discussion to-day—and for earnest discussion, recognizing the fact of the danger of an iridectomy injuring a sound eye, and on the other hand not forgetting the cases where an iridectomy should have been performed at the time of the first, or one of the earlier attacks, and where it has been put off by patient, or surgeon, or both, and the sight has been lost.

In looking over the cases in this paper there is one where there was an acute attack in one eye, which was slight, and

where no operation was performed, and where up to this winter there has been no recurrence.

In this list there are sixteen cases where up to the present time the second eye has not been affected. There have been five eyes where evisceration has been necessary, and there are two more eyes where it may be necessary later. All these seven eyes were affected with the disease for some time before iridectomy was performed. The experience in these cases was that sight was preserved and the disease checked just in proportion as the iridectomy was early.

In operating I used a cataract knife and make a large incision just beyond the edge of the cornea, not trying to go far into the sclera. Then I remove a large section of the iris and reach its root so far as possible. I use a two per cent. solution of eserine after the operation and prepare for the operation by the use of eserine and hot compresses if the tension is great, and use bichloride 1 to 5,000 as antiseptic.

Case 4. H. B., age 41, seen Sept. 12, 1887, with typical case of acute glaucoma, marked by vomiting, very high tension, great pain. Entire absence of vision in the right eye and grey cornea. Iridectomy September 14th without hæmorrhage under ether, and eye treated with eserine and hot fomentations. The pain persisted and iris seemed sluggish, the conjunctiva remaining bloodshot, with no tension. A two per cent. solution of atropine was used twice a day, under which treatment the eye improved with great rapidity.

Sept. 24. V. $= {}^{20}/_{20}$.

Jan., 1889. V. $= {}^{20}/_{20}$.

No recurrence in either eye.

5. Mrs. M. A. Mc., age 76. Seen first March 5, 1889. Diagnosis: glaucoma simplex of a year's standing in right eye. Uncertain in left, but failure in vision marked within last few weeks. Diagnosis corroborated by three other oculists, two of whom advised against operation, while one agreed with me that the operation afforded the only chance.

V. O. D. $+1$ D. sph. $\bigcirc$ $+1.50$ D. cyl. $180°$ ${}^{10}/_{200}$.

O. S. $+1.50$ D. cyl. $180°$ ${}^{20}/_{80}$.

O. U. Incipient cataract. Excavation marked. Field characteristic, no pain or tension. O. U. iridectomy downward March 9, 1889.

May 20. V$\overset{\frown}{\smile}$+2 D. cyl. 180° $^5/_6$. O. D. fingers at 5 ft.

Dec. 2. O. S.—0. 75 D. sph.$\overset{\frown}{\smile}$+1.50 D. cyl. 180° $^5/_6$.

Later the vision failed slowly in the right eye and remained in statu quo in the left eye. June 6, 1893, O. S.—2 D. cyl. 75° $^5/_6$. The patient died soon afterward, able to read up to the time of death. This case is dwelt upon at length, because it was very unfavorable with regard to prognosis, in the absence of acute symptoms.

6. Mrs. M. R. B., age 70. Seen July 6, 1889. O. D. acute attack of glaucoma supervening upon an old case dating back years. Great pain. T+2. Anterior chamber shallow. Pupil dilated, immovable. Fingers not counted. July 8 iridectomy, followed during the night by hæmorrhage and pain. July 17, evisceratio bulbi. The refraction of the left eye was —0. 50 D. sph. $\overset{\frown}{\smile}$ —1 D. cyl. 90° $^5/_6$, and the sight has remained good up to the present date. The refraction of the right eye could not be determined.

No. 8. Mr. A. J. B., age 43. Seen May 1, 1890. O. D. vision = fingers at 2 ft. Shows typical glaucoma excavation. Was operated upon twice several years before, iridectomies, though vision had disappeared previous to these operations, as he had been treated for a year with pills. No. 1 and 3, taken twice a day upon advice of a homoeopathic oculist. O. S. V.$\overset{\frown}{\smile}$—1 D. cyl. 88° $^5/_5$. In 1893 I eviscerated the right eye because of the unbearable pain. Left eye is in good condition today.

No. 36. Mr. K., age about 32. Suffered from acute glaucoma in both eyes. Iridectomy performed in Halle several times on each eye, so that almost the whole iris was removed. Sclerotomy was also performed twice. This was one of the most remarkable cases I have ever seen, because of the persistent return of the glaucoma and because of its eventual yielding to repeated operations. I saw the patient first in 1883 in Prof. Alfred Graefe's private clinic in Halle, and last in my office in Chicago in 1894 or 5, at which time the sight was very good in both eyes and there had been no symptoms of glaucoma for years.

No. 35. Mr. N. S. H., age 40. O. N. Blind for past three weeks, due to glaucoma of two to three years' standing. This man had never consulted an oculist, believing that the

failing sight was due to his chronic kidney disease. O. U. T+2. Iridectomy to relieve the intense pain. No vision of course resulted, and while the pain is now absent, after a lapse of three months, it is very possible that the eyes may have to be enucleated later.

DISCUSSION.

Dr. W. K. Rogers, Columbus, O.—This subject can scarcely fail to be of the most intense interest to all of us, and I am sure no apology is called for in behalf of a paper on this subject, in connection with which so much has been written and done, and concerning which the views of many observers have undergone considerable change in the past few years. The point of principal interest to me in the paper is the allusion to operative interference in cases of a chronic character, and I presume the doctor refers to the simple, non-irritative variety of glaucoma under this head. I believe there is a growing tendency to resort to iridectomy in these cases, as compared with the past, and I would like to add my small modicum of experience. I have operated on seven of these cases, covering a period of ten years, and I have not had cause to regret this procedure in more than one instance, and even in that it is fair to assume the difficulties experienced might have been encountered even without the operation. In this case the patient was a woman upwards of 65 years of age, with marked atheromatous condition of the vessels. It was necessary to use a general anæsthetic, and the patient developed an attack of emphysema with paroxisms of coughing, which resulted in intra-ocular hæmorrhages. She eventually made a fair recovery. One eye retains vision practically equal to that before the operation, and the other eye suffered a diminution of about two-thirds. This was some seven years ago, and up to the present time there has been no increase in the impairment of vision and no exacerbation of the glaucomatous symptoms, whereas before operation vision was progressively deteriorating.

Dr. W. H. Wilder, Chicago.—I want to compliment Dr. Fiske on his excellent report of cases. It is certainly a most important subject and one, it seems to me, which can not be covered as thoroughly as it should be in the time at our disposal. I think very few of us doubt the efficacy of

iridectomy in the acute or even the chronic forms of glaucoma where there are acute attacks. As to the pathology, I do not see how the theory of Weber and Knies holds good when the anterior chamber is deeper than normal. In such cases I prefer the anterior sclerotomy or the posterior sclerotomy. I had a case with brilliant results where the posterior sclerotomy changed the vision from almost zero to $^{20}/_{20}$ in two weeks, and this good condition remained for two or three years, before the case passed out of my observation. It seems to me the most important thing in the study of glaucoma and the study of the effect of operations, is a careful record of the field of vision. Every one has had cases of chronic glaucoma where central vision was normal, as in some of Dr. Fiske's cases, and where the peripheral vision is much contracted. I have a most unfortunate case, in which the man's central vision was $^{20}/_{40}$ up to the day I did an iridectomy. He had absolute glaucoma in the left eye. In the right eye slight increase of tension, excavation of the optic disc and $^{20}/_{30}$ of vision with a marked contraction of the field. The field contracted more and more until it seemed to him as if he were looking through a gun barrel. Still he had $^{20}/_{40}$ and better of central vision. An iridectomy was done, and immediately after the excision of the iris the vitreous was forced into the wound and this was quickly followed by a profuse intra-ocular hæmorrhage.

Dr. C. Barck, St. Louis, Mo.—This subject is always an interesting one, especially as the opinions are still divergent as to the best method of treatment. Until lately many, especially American ophthalmologists, were opposed to operative interference in chronic glaucoma; but late years have furnished us statistics which enable us to judge better on the final results of operations. One of them is from Hirschberg's clinic in Berlin (*Centrlbl. f. Augenhk.*), the other is by Haab, in Zürich (*Glaucoma and its Treatment*, 1902). Both authors took especial care to keep the cases under observation—which is easy in countries where the population does not often move from place to place — and only such cases were included in the statistics in which two or more years had elapsed since the operation. The statistics agree with each other to a remarkable extent. Haab's results were as follows:

Glaucoma simplex, 76 cases—resulted in blindness, 29 per cent.; fair result, 29 per cent., good result, 42 per cent. =71 per cent.

Glaucoma, inflammatory, chronic, 37 cases—resulted in blindness, 43 per cent.; fair result, 27 per cent.; good result, 30 per cent.=57 per cent.

On the other hand, out of the 15 eyes treated with drugs alone, the results were, blindness, 60 per cent.; fair result, 40 per cent.

Hirschberg's results were very similar.

In the light of these statistics, it seems to me that we cannot reject operative interference any longer in a disease with such a poor prognosis otherwise.

It seems to me that the different substitutes for the old-fashioned iridectomy, viz., anterior sclerotomy, incision of the iris angle, etc., have been gradually abandoned. My custom is, and I would advise, an iridectomy not only in acute, but also in simple and chronic glaucoma, as early as possible. This I follow up by the use of eserine or pilocarpine. Should the diminution of sight continue in spite of the first operation, I add a posterior sclerotomy.

Dr. Reynolds.—I do not wish to discuss the theories and etiology of glaucoma. I concur with Dr. Wilder in the great importance of making frequent record of the field of vision. It is in the peripheral contraction of the field of vision that we find the first manifestation of increasing danger. I believe it is safer to do an iridectomy in all cases, because of the risk of an advancing peripheral contraction of the field and increasing amblyopia, which may be so nearly imperceptible as to deceive us.

I think it might be stated that one-half of the fatal results of iridectomies done in cases of high tension might be avoided by giving a dose of Rochelle salts, and for a few hours, after the first action of the salts, the salicylate of sodium in the definite dose of ten grains every half hour in a half pint of water, until pain disappears and tension is reduced.

At the time of operation a few drops of 1—1,000 of the chloride of adrenaline solution is important. This should be repeated at short intervals for the next ensuing twenty-four hours after operation, to restrain hæmorrhage.

Dr. J. A. L. Bradfield, La Crosse, Wis.—I wish to report a case which illustrates the possibilities in what seems an almost hopeless case. In 1896 I was consulted by a stationary engineer, 35 years of age, for failing vision of right eye, which equalled $^{20}/_{60}$. Diagnosis: chronic glaucoma; iridectomy advised and rejected. Eserine was prescribed, but as I did not see him but once after, I do not know how long it was used.

July, 1901, he again consulted me. The right eye had been blind several months. Two weeks previous left eye became very red and painful. Patient vomited and had to be kept under the influence of morphine. As the vision became so poor he was unable to see even enough to recognize his own family, he again called on me, when I found the following condition: Vision of right eye—perception of light, tension plus 3; typical atrophic cupping disc. Left eye—severe ciliary injection; widely dilated pupil; cornea very cloudy; anterior chamber almost obliterated, and tension very high; pain, intense; vision, perception of moving objects.

Under holocaine anæsthesia made small incision with a very fine Graefe knife. The iris prolapsed with the completion of the incision and the wound gapped so as to greatly endanger the position of the lens.

Recovery uneventful. Four weeks after operation patient resumed his former work which he has followed ever since with correction of error of refraction. Vision equals $^{20}/_{20}$. Tension is perfectly normal and eyes comfortable.

Dr. J. O. Stillson, Indianapolis, Ind.—I rise to subscribe to what Dr. Barck has said as to the advisibility of an early iridectomy. I do not feel that we understand the etiology of glaucoma. I usually find that in this early stage of glaucoma simplex there is a narrow anterior chamber. Whether it be the pressure of the proportionally large lens and small eyeball on the ciliary body, which causes the stoppage of circulation of the fluids from the posterior to the anterior portion of the eye, or not, we do have this condition here which evidently necessitates surgical interference. Even if the sight is good, I think we should urge an early iridectomy. I think that eyes are frequently lost in an effort to make an iridectomy in a narrow anterior chamber with a lance-shaped knife.

Dr. Hotz.—I think we will not find a satisfactory theory of glaucoma as long as we try to apply the same explanation to different conditions. Clinically, we have two different conditions—the typical glaucoma and the so-called glaucoma simplex. In the one we have periodical attacks or exascerbations and remissions. In the so-called simple glaucoma we have nothing of that sort. In the first class we have a shallow anterior chamber; in the second class we have a normal and sometimes even deeper than normal anterior chamber. In the first class we have tension increased; in the second class we often cannot find increased tension at all if we examine the eye every day. But we sometimes find a deep excavation of the optic nerve. This shows there must be some different pathological process underlying these cases. As long as we try to bring the two under one head we will not come to a satisfactory conclusion. The pathologists labor under difficulties, because they get the eyes in the last stage of the disease. They cannot examine the condition of the acute glaucoma. They see the eye afterwards; they see the result of secondary processes. That is the excuse the pathologist offers for not furnishing us better light on the subject.

I certainly cannot take any other ground than that Dr. Fiske has proposed, to perform an iridectomy as early as possible after the glaucoma has set in. I also endorse his position in regard to performing an iridectomy on the second eye, if the eye shows any premonitory symptoms. I would, however, not perform an iridectomy on the other eye if it shows a perfectly normal condition. It might not become glaucomatous for ten years or longer.

Dr. Suker.—In speaking of the pathology of glaucoma, I think it might be advisedly considered a uveitis of some kind. I agree with the doctor that we should do an iridectomy in both eyes, in one as a preventive when the other eye is attacked with glaucoma.

I would not use 2 per cent solution of eserine; even 1 per cent is irritating at times. Although it is used, I think it is not good practice.

I do not believe an iridectomy will do much good when you have a deep anterior chamber.

Dr. Alt.—I wish to say to Dr. Suker that, pathologi-

cally, glaucoma is not found to be uveitis. From the examination of a very large number of glaucomatous eyes I am firm in the conviction that this is not the case, although a secondary glaucoma may ensue in cases of uveitis.

Dr. Fiske (closing discussion).—My reason for writing the paper was to make a plea for the early iridectomy, and I was pleased to hear most of the members who spoke agree with me. In Zürich, Prof. Horner first advised me to do iridectomy for simple glaucoma.

I do not agree with Dr. Suker about the uveitis. With 2 per cent eserine I have never had irritation.

I have never seen a case of glaucoma where there was distinctly a deeper anterior chamber than in the ordinary eye where there were no adhesions between the iris and the lens. I do not think you have normal vision in those eyes where there have been attacks of glaucoma.

BOOK REVIEW.

Entre Aveugles (Among the Blind). By Dr. Emile Javal. Paris. 1903. Masson et Cie. 120 Boulevard St. Germain.

The celebrated author who lost his own vision in consequence of glaucoma a few years ago is evidentally not mentally broken by his dire misfortune. As his whole life was given up to helping unfortunates, he, having entered their ranks, immediately took up the task of improving the conditions of the blind and to give good advice from his own experience to those who must look forward to losing their eyesight. It is interesting and pathetic alike to note the manner in which Javal tries to render himself and his co-sufferers independent of the help of others, and that he succeeds in a very large measure he shows in this little brochure. When reading this little book we could not help sympathizing with our unfortunate confrére more than ever, but also congratulating him on being able to render his own condition so much better by his good and manly sense. The blind and the seeing can learn a great deal from him and his most excellent and interesting book.

Alt.

MEDICAL SOCIETIES.

SEVENTY-FIRST MEETING OF THE BRITISH MEDICAL ASSOCIATION.

Section of Ophthalmology.

After the President, Mr H. E. Juler, had made a few remarks in commencing the work of the Section, Mr. Stanford Morton opened the discussion on the Operative Treatment of Conical Cornea. He remarked that although he usually did the operation of excision of the apex, yet he held no brief for any one method. He urged the necessity of recording all cases, good and bad, before an accurate opinion could be come to as to the best method of operating. He gave details of thirty operations. Mr. Tatham Thompson described a method he had adopted of passing horse-hair sutures through the cornea. This he had given up, and used now only the cautery short of perforating, and latterly he had done an iridectomy previous to cauterizing, as it much lessened the chances of after-complications. Dr. Karl Grossmann had operated on about ten cases and described his methods. Mr. Richard Williams (Liverpool) found that glasses improved a vast number of cases and operation was seldom necessary. He preferred perforation with the cautery. Mr. Doyne never now did anything but cauterization without perforation, and thought the operation most satisfactory with one sitting. The President used several methods and had done about twenty-five cases, but the results were not so brilliant as those of Mr. Morton. He preferred the cautery himself with a small perforation, and thought we should be able to come to a conclusion as to when it should be necessary to operate. Mr. Morton, in reply, thought that it was very difficult to gauge the depth of a suture, and was very diffident in putting in stitches. He would prefer not to do an iridectomy in all cases. Sometimes it was useful. He would not operate if the vision could be brought up fairly high with glasses, and he thought that all operations had their own peculiar merits in certain cases. Major H. Smith read a paper on the Extraction of

Cataract in its Capsule. His results were drawn from about 8,000 operations, of which 2,000 were done with opening the capsule, and 6,000 by extraction with the capsule. He found that in about 4 per cent. of these cases the capsule was left, and it should then be caught with forceps if possible, or, if it were too far retracted, the contained lens matter should be pressed out. Out of 1,023 cases 6.6 per cent. had escape of vitreous. The visual results were far better when the capsule was removed. Iritis was seldom seen if the lens was removed in its capsule. Mr. Bishop Harman had done an extraction in which he accidentally removed the lens in the capsule; the case did quite well. Dr. Brailey had great difficulty in knowing how great pressure should be used in order to get the lens out. The President had seen the operation done, but nearly always with escape of the vitreous. Dr. Darier (Paris) read a paper on Subconjunctival Injection of Koch's Tuberculin from a Diagnostic and Therapeutic Point of View. The patient was a girl who had tuberculous interstitial keratitis. He also read a second paper on the Treatment of Serous Syphilitic Diseases of the Eye, in which he strongly advocated the use of subconjunctival injections and intravenous injections of cyanide of mercury. He thought the treatment should be pushed and persisted in. Mr. Sydney Stephenson strongly advocated the method advocated by Dr. Darier.

Second Day.

Mr. Nettleship opened a discussion on Ocular Changes in Relation to Renal Disease, and said that, although much was already known regarding the eye changes in renal disease, yet information was still needed on several points both from physicians and ophthalmologists. He discussed the question of retinitis occurring as the result of lardaceous disease, as well as from nephritis due to inflammation of the bladder, ureter, and pelvis of the kidney. With regard to pregnancy retinitis, his cases showed that the prognosis in this condition was better than in retinitis due to other diseases. With regard to cases other than pregnancy, there were twice as many males as females affected. With regard to the retinitis of glycosuria which occurred with some albuminuria, he thought that, although some of the changes might be due to

the latter, yet glycosuria had been shown to be the cause of it in cases when there was no renal disease. He said that among other points requiring elucidation were the influence of inherited syphilis and scarlet fever, and the nature of the ophthalmic appearance of the white opaque thickening of the coats of arteries and veins. Dr. George Carpenter mentioned three cases in children, and Mr. Henry Power recorded two cases. Mr. Hartridge thought that many cases were toxic. Mr. Silcock said he had never seen retinal changes in cases of well-marked surgical kidney without cardio-vascular changes due to interstitial nephritis, neither had he seen changes in cases of suppression of urine. Dr. Reeve (Toronto) urged the importance of the routine examination of the urine. Mr. Doyne and the President also made remarks. Dr. Karl Grossmann described a case of aniridia in which he observed the effects of eserine on the shape of the lens, and he found that both anterior and posterior surfaces bulged, and the equatorial diameter of the lens became less. Mr. Harman thought that it was unwise to draw general conclusions from a single case which was evidently very abnormal, and Mr. Silcock agreed. Mr. Nettleship asked as to how much accommodation the patient had. Mr. Grossmann replied about 2.5 D. Mr. W. T. Lister read a paper on Epithelial Tumors of the Conjunctiva. They were non-malignant, and showed simply heaped-up epithelium. He gave a lantern demonstration of the sections. Mr. Sydney Stephens read a paper on Interstitial Keratitis in Acquired Syphilis. He described a case and mentioned several cases already recorded. Figures showed that from 9 to 10 per cent. were due to acquired syphilis. Mr. Devereux Marshall mentioned a case that had come under his own observation in which the choroid was first affected and subsequently keratitis developed. Mr. Stephenson said that this combination had been seen in several of the cases. Mr. Doyne read a paper on the Treatment of Atrophia Retinæ with Retinal Extract. He referred to the difficulty of getting the fresh retinæ, and also to the fact that an extract had been prepared. In cases of retinitis pigmentosa the diet had to be continued or sight went back. He gave details of several cases; tobacco cases quickly improved, and he had had good results in a case of optic atrophy.

Mr. Sydney Stephenson mentioned three other cases, one of which was a case of tobacco amblyopia which was cured in spite of his continuing to smoke. Mr. Nettleship had seen some of Mr. Doyne's cases, and said he was not yet convinced as to the improvement in their vision. Dr. Edridge-Green said that some years ago he had tried to prepare an extract of visual purple. This had quite failed. Dr. Darier had previously tried extract of retina, choroid, and ciliary body. He injected this subconjunctivally; the patients improved, but it was very transitory. He got nearly as good results with sodium chloride injections. Dr. Edridge-Green moved his resolution on the tests for color blindness for the public services. Mr. Beaumont seconded this, and it was carried unanimously.

Third Day.

Mr. Hartridge opened a discussion on the Treatment of Convergent Squint. In order to undertake the treatment satisfactorily we must discover the various factors which helped to produce the disorder. There were three methods of treatment—(1) optical, (2) orthoptic, and (3) operative. The two former should be carried out for at least one year before an operation was done, and as the condition was one of abnormal innervations, so operations on the muscles were unscientific and deformity was nearly always produced. He proposed as points for discussion—(1) When was an operation necessary or justifiable? and (2) What operation gave the best results? Mr. Claud Worth read a paper on Methods of Preserving or Restoring the Vision of the Deviating Eye and Developing the Fusion Sense. He said that no child was ever too young to wear glasses, and that congenital amblyopia was exceedingly rare. Atropine should be used to the fixing eye only for several weeks or months, and thus making the deviating eye useful for near work. From investigations he had made on infants he had found the first certain evidence of binocular vision between four and five months of age. The fusion sense was fully developed at six years; attempts at fusion training after this age were mere waste of time. He described his methods of educating the deviating eye, and gave his results in a large number of his cases. Mr. Tatham Thompson (Cardiff) said that he thought glasses

should be worn as early as possible, but that one seldom saw the patient before 4 years. His tendency was to do less and less in the way of tenotomy. He never operated upon both eyes at the same time, and he would much prefer it to advancement in squints above 15 or 20 degrees. In advancements he split the tendon and took one-half above and one below the level of the cornea. Mr. Maddox said that he fully agreed with Mr. Hartridge and Mr. Worth, and thought the latter had done good service in insisting on the necessity of early training. After Mr. Harman had spoken, Dr. Darier said that both eyes should not be operated upon at the same time. He thought that advancement combined with tenotomy was the best operation. Dr. Reeve (Toronto) also was opposed to operations on both eyes together; he described several operations. Remarks were also made by Dr. Grainger and the President. Mr. Lister asked whether the operations done by Mr. Hartridge and Mr. Worth were done under an anæsthetic when the patient was under puberty. He thought the results of operations done under cocaine were excellent, but not so when an anæsthetic was used. Mr. Hartridge in reply said that anæsthetics were necessary in children. Mr. Worth said that in cases in which he had been able to train the fusion sense, he had no hesitation in resorting to operation at any age, because the trained fusion sense could be relied upon to do the fine adjustment; but in cases in which binocular vision was out of the question he never operated until he was able to do so under cocain. Mr. Tatham Thompson read a paper on the fixation of the eye during operations in intractable patients. This consisted of passing sutures on both sides of the conjunctiva near the cornea at the level of the center of the cornea. It caused far less gaping than the ordinary forceps. Mr. Bronner thought that two pair of forceps would do as well. Mr. Beaumont (Bath) described some double forceps he had used. Mr. H. Collen Ensor described an improved operation for ptosis. Major H. Herbert, I.M.S., read a preliminary note on the pathology and diagnosis of spring catarrh, and also read a further note on the superficial punctate keratitis of Bombay. Dr. Bronner described a modified Mules glass ball for use after removal of the eyeball. Mr. Bishop Harman read a

paper on the knee-jerk phenomenon in interstitial keratitis. Mr. Doyne said that in thirty-two cases of interstitial keratitis he had found the knee-jerk present in all. Mr. Beaumont tested fifteen cases, and in all the knee-jerk was present. Mr. Bishop Harman described an improved operation for congenital ptosis. He mentioned several objections in Mule's operations with wire, and he used a gold chain to take its place.

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

METASTATIC CARCINOMA OF THE CHOROID, WITH REPORT OF A CASE AND REVIEW OF THE LITERATURE.

E. L. Oatman (*American Journal of the Medical Sciences*, March) reports a case, discusses the general appearance of this condition and briefly reviews the thirty cases on record that may be considered genuine.

It usually occurs in early middle-life. The primary growths are usually in the breast (though other organs may be primarily involved), and as a result we find more females suffering from corcinoma of the choroid than males. The theory that the left eye is the most frequently invaded is not supported by his statistics. In one-third of the cases both eyes were involved. The deposit is always found posteriorly, near the point where a short ciliary artery enters the globe, and appears at the corresponding point in the other eye when it is attacked, indicating that the second eye is not invaded by way of the lymph channels of the optic nerve and chiasm. The typical shape is a flat discoid thickening with a central elevation. Vision rapidly fails, due to the early and extensive detachment of the retina. Sight is completely lost in from two to eight weeks. The tension is diminished or normal in over two-thirds of the cases and increased in about one-third.

The condition is hopeless; the average duration of life, after eye symptoms appear, is six and one-half months. He

does not advise operative interference unless very painful, as it may hasten the fatal result.

The following points are noted and will enable us to differentiate between carcinoma and sarcoma.

Carcinoma of the Choroid	Sarcoma of the Choroid
Always secondary.	"Secondary sarcoma of the choroid is unknown." (*Fuchs.*)
Has always occured posteriorly, usually on the temporal side of the nerve.	May occur at any point.
A flat discoid tumor or thickening of the choroid which spreads laterally.	A rounded protruberance growing out into the vitreous.
Early detachment of the retina.	Late detachment when centrally located. (*Griffith.*)
Destroys vision in a few weeks.	May exist a long time with good vision.
Has not been described as being vascular.	May appear vascular.
May be very painful with T. N. or T—.	Pain is due to +T.
First symptom may be a rapid increase of hypermetropia without marked ophthalmoscopic changes.	Too circumscribed to produce hypermetropia.
T. may be diminished.	If confined to the choroid T. is never diminished. (*Marshall.*)

BOOK REVIEWS.

TWO RECENT BOOKS ON REFRACTION AND OCULAR MUSCLES.

1. The Refraction of the Eye and the Anomalies of the Ocular Muscles. By Kenneth Campbell, M.B. Edin., etc. New York: Wm. Wood & Co. 1903. pp. 214. Price $1.75.

2. The Errors of Accommodation and Refraction of the Eye and Their Treatment. A Hand-book for Students. By Ernest Clarke, F.R.C.S., Eng., etc. New York: Wm. Wood & Co. 1903. pp. 225. Price, $1.75.

If the appearance of books on the subject is any indication, there is an increasing interest in questions of refraction and ocular muscles on the part of the student body in medicine at this time. The publication of two books of this character simultaneously, both of British parentage, must have been in reply to a demand for additional help felt by the student or teacher, or both, for some simpler or more complete elucidation of the laws governing the refraction and movements of the eye than had existed before. The multiplication of books on any subject is a proof that one satisfactory in all particulars has not been furnished. The importance of anomalies in refraction and ocular movements has become so pressing in practice—thanks largely to American workers in those branches—that the necessity is felt to be urgent for a complete knowledge on the part of the practitioner of all the refinements in diagnosis and treatment. To furnish this knowledge is the commendable ambition of these two small brochures. That they supply much that is desirable and necessary must be at once conceded. That they, either separately or combined, do not give all that is desirable or necessary is due to the fact that they have attempted the impossible, and thereby have fallen short of a complete realization of their aim.

This is of necessity. No book of 225 pages, 12 mo., can give a full exposition even of the principles of refraction and ocular movements. The great work of Donders and his followers cannot be boiled down and given in tabloid form. The result is that each new little compendium is written to supply some special deficiency the author felt to exist in all others and necessarily represents his own point of view. This is not to be undervalued, since every careful observer must have found something that deserves consideration at the hands of his fellow workers. So long as students are desirous to have some one else do most of the thinking for them and rest satisfied with just enough knowledge to "get through," quiz compends and *vade mecums* will abound. The most, or

least, that we can ask of them, then, is that they shall be accurate as far as they go and represent, approximately at least, the sum of our knowledge up to the time of publication. These two brochures have much to commend them. They are well printed, as most English books are, are abundantly illustrated, and are for the most part lucid in the treatment, however short, of the themes presented.

We hope we will not be deemed ungracious, however, if we point out some errors and points of difference in opinion and experience which might be naturally expected where our knowledge is yet far from complete and observation is still difficult.

Perhaps that which will strike the reader first as most curious and unaccountable in running over Campbell's book is the absence of any mention of the ophthalmometer. On the other hand, Clarke gives quite a considerable space to its application in practice and evidently regards it as most valuable in testing for astigmia, and makes a statement in this connection which sounds strangely coming from the country where the shadow test has, probably, its greatest vogue. He says (p. 119): "Retinoscopy is a very valuable help in estimating astigmatism; it is accurate and simple, but not so delicate as the ophthalmometer." His faith in the ophthalmometer is seemingly based upon his belief that lenticular astigmia is insignificant, since he states (p. 118): "Further, as lenticular astigmatism must necessarily be very small, it can only neutralize a low degree of astigmatism in the cornea." What lenticular astigmia is present he considers due to partial contraction of the ciliary muscle, with its attendant consequences of asthenopia, headache, etc. He claims that $^1/_8$ D. of astigmia can be revealed by the ophthalmometer (corneal of course), and places the normal lenticular astigmia "against the rule" at 0.25 D. We have never, we believe, seen the normal lenticular astigmia placed so low as that, and some have placed it as high as 0.75 D. In all but exceptional cases it certainly reaches 0.5 D. Then again he makes no mention of the lenticular astigmia due to an oblique position of the lens. It is more than probable that all lenticular astigmia of the normal kind is due to this, and there is certainly a large number

of cases of the abnormal variety that is above 0.5 D. which must be placed in the same category since it fails to disappear under persistent use of the cycloplegic.

In skiascopy Clarke uses the plane, while Campbell employs the concave mirror.

A very remarkable statement in regard to the difference in the practical use of crossed cylinders and the ordinary sphero-cylinder is made on page 129, when, in speaking of the advantages of the latter over the former, he says: "If by any chance the glasses (crossed cylinders) are worn askew, both axes will be wrong, whereas, in the proper method (sphero-cylinders) with *one* cylinder only one meridian will be affected." We are sorry Mr. Clarke does not explain by what law of physics the axis of the cylinder affecting one meridian in a sphero-cylinder can be displaced without affecting the axis of the meridian at right angles to it. We have known for a long time now, through the work of Prentice, Jackson and others that all sphero-cylinders are optically crossed cylinders with the axes at right angles to each other and *vice versa;* and if one axis is displaced the other must inevitably be so to exactly the same extent. The advantages of the sphero-cylinder are its greater ease of manufacture and greater cheapness. For certain purposes the crossed cylinder, however, has also its own advantage. The following statement, however, redeems any errors like the above which may have crept in through inattention: "Remember that our objective examination is our guide and servant; it must never be our 'master.' The subjective examination must always *have the last word.*"

A new and unfamiliar use of "bifocal" as applied to lenses is given on pages 148-9, where a lens is described which has a power of —6 at the center and —2 at the circumference. In this country this term is used, universally, to designate lenses in which the upper portion is used for distant vision and the lower portion for reading.

The portions in both books on the ocular muscles are based largely upon the work of Maddox, not, however, without mention of American authorities. The work of Campbell is more complete in respect to muscles than that of Clarke. In crediting up the work on prismometry among

Americans Clarke has fallen into an error in apparently crediting to Dennett the discovery of the relation between the new method of designation by centrads or prism dioptries and the meter angle. While it is true that "the centrad has a relative value to the meter angle in that half the number of centimeters between the pupils indicates the number of centrads in the meter angle" (p. 211), it was Prentice who first established this law in his article on "A metric system for numbering and measuring prisms," published in *Knapp's Archives* in 1890. In the section given to the relation of the prism dioptry to the meter angle he says: "Read the patient's interpupillary distance in centimeters when half of it will indicate the prism dioptries required to substitute one meter angle for each eye." In the same paper he also announced the law, attributed by Clarke to Maddox, of the relation of the prism-dioptry to lens dioptry by which "any lens is capable of producing as many prism-dioptries as the lens possesses dioptries of refraction, provided it is decentered one centimeter." Clarke also gives the law of Holden for decentration with the degree as a unit, which differs but little from the prism-dioptry and centrad, and is much less simple. The practical value of the prism-dioptry is demonstrated by the fact, probably not generally known, that all the prisms manufactured in the United States since 1895 have been measured and numbered by the prism-dioptral system, and whether we recognized it or not, we are using prism-dioptries in our work every day, even though we may order our prisms in degrees or centrads.

On the whole, however, these little books, if carefully studied, will yield much value to the undergraduate and to the practitioner who feels that he must "know something of eye-work."

S. M. B.

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ORIGINAL ARTICLES.

HOW TO AVOID SECONDARY OPERATIONS AFTER CATARACT EXTRACTION.*

By C. BARCK, M.D.

ST. LOUIS.

THE endeavors, in cataract, to reestablish useful vision by one operative procedure are old. Unhappily the ideal method—removal of the lens in the capsule—as aimed at by Pagenstecher and others, can, up to the present time, be safely accomplished by no proposed technique.

Some years ago, the cystotome was replaced by the capsule forceps, which is still used by many operators. Others, among them myself, have again discarded the latter, partly because the results were not much more certain than with the former and partly on account of some dangers connected with its use. But one of the objects in selecting this theme was to hear the views of those present on this instrument and to find out how much it is in use to-day and with what success.

The oldest method of dealing with the capsule was a crucial incision in the pupillary area, which often opened it imperfectly, so that capsular cataracts were frequent. Then Knapp introduced about 14 years ago his "peripheric horizontal incision" in the upper third of the capsule. Secondary operations became still more frequent. This was to be expected since the larger part of the capsule, the lower two-

*Read before The American Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 10, 1903.

thirds, remains intact *in situ*. Knapp, with his method, accepts the necessity of the secondary operation as the rule rather than the exception. In his second series of a hundred cases of simple extraction, he performed discission in 74 instances (*Archives of Ophth.*, 1889). The immediate result, as regards the vision, was not once equal to $^{20}/_{20}$; after discission it increased to $^{20}/_{20}$ in 30 cases. In his third hundred (*Archives of Ophth.*, 1890) he made a secondary operation 53 times. By the primary operation he secured a vision of $^{20}/_{20}$ in only one case; by the secondary this was obtained in 20 additional ones. But Knapp adds that he feels certain that many cases of this series would present themselves for secondary operation later on.

I had practised the peripheric horizontal incision for a number of years before I gave it up on account of the number of secondary operations which it necessitated. I need not dwell here on the inconveniences which they cause, especially in patients living at a distance, who must come a second time to the city. Furthermore, although it is small, still there is a certain amount of danger connected with discission. From my personal experience I recall one case of a glaucomatous attack following discission which, however, subsided without any permanent damage. Others report similar consequences; still others, acute or subacute irido-cyclitis, with its dire sequalæ.

About three years ago I abandoned this method, and have gradually developed the one which I now use. It is a return to the old method, with some modifications. I lay the main stress on a long, vertical incision, commencing inferiorly, going with the cystotome between the iris and the lens capsule downward to the very periphery of the lens and dividing by an upward movement the lens capsule as extensively as possible. At first I added to this a horizontal incision both right and left. In order to simplify the procedure and to reduce the strokes of the cystotome to two, I devised the following method. The first incision is of a crescentic shape, commencing laterally from the lower end of the vertical meridian; the second one commencing just as far mesially from this, meets the first somewhat above the center of the capsule. (See drawing). It is very important that the two incisions

really intersect. If correctly carried out, the lower triangular flap as a rule falls downward, and the upper portion retracting, leaves a clear, central pupillary area.

In a number of instances, the remnants of the capsule placed themselves so that they just filled out the coloboma left by the iridectomy. Such a result is of course beneficial both from a cosmetic as well as from an optical standpoint. In five of my last 50 cases I had to make a discission, that is in 10 per cent. In two of these the extraction had been followed by iritis causing a closure of the pupil. In the third, the patient had been dismissed with good vision; some months afterwards a severe infectious disease was followed by an iritis and, in consequence of want of proper treatment, by a closed pupil. The number of cases, therefore, where the obstruction was due to the capsule alone, is a very small one. After these very satisfactory experiences with this form of incision, I feel justified in recommending it to you for fur ther trial.

DISCUSSION.

Dr. Alt.—The advantage I can see in the incision of the capsule recommended by the essayist is that no upper capsular flap is formed which may become engaged in the corneal wound. This, however, can be avoided in other ways, especially by the peripheral capsulotomy, with vertical section added, as I always practice it. As ingenious as Dr. Barck's capsulotomy may be, I do not see how any form of incision in the anterior lens capsule can prevent a secondary cataract from forming and necessitating a secondary operation. It is not the anterior but the posterior capsule, in my experi-

ence, which by wrinkling and slight tissue-formation gives rise to what we term a secondary cataract. I fail, therefore, to see how this incision of the anterior capsule can be of value in preventing it. Nothing but the removal of the lens capsule can do so, and even then the formation of fine connective tissue threads may produce a quasi-secondary cataract. This, also, happens when, as Hasner recommended, the posterior lens capsule is incised as soon as the cataract has been expelled. I have often done this, and abandoned it, since it did not prevent the formation of a very thin membrane which obstructed the former opening and which undoubtedly resulted from the inherent injury to the anterior parts of the vitreous body. It seems to me that no method of extraction can insure against the necessity of a secondary operation, but surely no kind of incision in the anterior lens capsule can do so.

I should also think that Dr. Barck's incision leaving a pouch at the upper periphery of the capsule might interfere with an easy delivery.

Dr. Stillson.—I am in the habit of trying to make a round incision. My chief difficulty in my last fifty cases has been from a little membrane or veil which forms after the extraction of the cataract. This I take to be the remains of the posterior capsule of the lens or the hyaloid membrane which marks the anterior boundary of the vitreous. If the doctor will tell us how to get rid of this interference to vision I will take it as an especial favor. The opacity of the anterior capsule after an extraction is certainly an undesirable outcome to what we so often know to be a really good extraction; and I never liked the idea of leaving this for a second ary operation, so I have as a rule not only incised the capsule freely, but I always wash out the pieces and frequently go in after the capsule with forceps; but as before mentioned it is the deeper membrane which bothers me and which I never like to pierce with a knife if there is any way to avoid it.

Dr. Fisher, Chicago.—Dr. Barck's paper is certainly very interesting, and anything that will add to that contribution will be very valuable. In a paper of this kind, that is of so much importance, I think that Dr. Barck should give us more details regarding the vision after operating. I am of

the opinion that his paper would be more valuable if he would group his cases and give us his results.

We do not know what vision Dr. Barck is satisfied with after a cataract operation. The operation is an ingenious one, and if Dr. Barck gets good vision in all his cases without a secondary operation, it is certainly a very valuable one. If we are satisfied with $^{20}/_{30}$ or $^{20}/_{40}$ or $^{20}/_{50}$ of vision, we might in many cases avoid operation. I would like to ask Dr. Barck what he regards as sufficient vision to avoid secondary operation.

Dr. Hotz.—The only way to avoid secondary cataracts is to remove the lens within its capsule, no matter what ingenuous incision you may make. It is not the anterior capsule which gives the most trouble. We find afterwards a fine veil spread over the pupil, and that is the posterior capsule, dusted over with fine deposits, as the result of some slight uveitis or hyalitis following the operation. No ingenious splitting of the capsule will avoid secondary operations.

Dr. Rogers.—This subject is very near to my heart on account of the attention given it by my associate, Dr. Clark, and I have made a rough diagram on the board which will illustrate a method devised by him about eight years ago and since then used by both of us when practicable. Two vertical incisions are made in the capsule on either side of the pupillary space, extending well towards the periphery; these are united by a cut that crosses their upper limit, extending three or four mm. beyond them, if possible, parallel with the periphery of the lens. In this way a flap is formed as Dr. Barck has illustrated, without the disadvantage of the lens occasionally rotating. Occasionally the little flap can be cut across below without undue traction or instrumentation, in which case the result is most satisfactory. I agree with Drs. Alt and Hotz that it is absolutely impossible to get a perfectly clear opening entirely free from even a diaphanous sheet unless the lens is removed in its capsule. But certainly the nearer we can come to it the better.

Dr. Greene, Dayton, O.— The ideal operation for the extraction of cataract, when we wish to eliminate all chance of a secondary operation, is to extract the lens within the capsule. The next method of operating, which at all ap-

proaches it in efficiency, is that of extracting the anterior leaf of the capsule. By this method we accomplish two things. We make the capsulotomy and avoid the secondary wrinkling and opacification of this portion of the capsule leaf so commonly seen a year or more after the extraction has been made. One or the other of these methods should always be employed in hypermature cataract, in operable cases of complicated and in all cases of traumatic cataracts where the capsule is thickened from inflammatory changes. For some time past, with the idea in view of so opening the capsule that it would by virtue of its elasticity withdraw from the pupillary area, and thus avoid, when possible, the necessity for a secondary operation, I have been opening the capsule by crossed incisions, using two cystotomes, one with its cutting edge parallel with the shank of the instrument, this to cut from below upward; the other with its cutting edge at a right angle with the shank, with which the lateral cuts are made. The result is a division of the anterior leaf into four sections, which have gotten out of the way in a very satisfactory manner in the limited number of cases in which I have followed the method. Next year I hope to have more to say about this method and the visual results obtained.

Dr. Barck (closing discussion).—In regard to what Dr. Alt has said, will say that I have never seen any difficulty in expressing the lens. On the contrary its delivery, with this section, is a very easy one. Furthermore, since I perform such an extensive laceration of the capsule, I do not recollect seeing a single prolapse of the vitreous.

As to the shriveling or shrinking of the posterior capsule, which becomes apparent only years after the extraction, this cannot be prevented, of course, by any form of capsular incision, but only by the extraction in the capsule. However, my paper plainly stated that it did not deal with these, but with the immediate secondary cataracts due to the presence of the anterior capsule within the pupillary area.

As a rule I am satisfied with a vision $^{20}/_{30}$, and would try to improve this degree by discission only under exceptional circumstances. In the instances where the vision was a lower one this was not due to the presence of the anterior capsule within the pupil.

ELECTRO-CAUTERY TREATMENT OF CORNEAL WOUNDS AND ULCERS.*

By JNO. A. DONOVAN, M. D.,

BUTTE, MONTANA.

FROM the natural conditions of the city in which I live, mining and treating ores is the principal industry. In such occupations, corneal injuries are of the most frequent occurence. In my ophthalmological work, conditions resulting from corneal injuries constitute a great portion of my practice; in fact, much more than any other disease.

With the laboring man, time is an essential feature in surgical treatment, as everyone desires treatment by the method with which can be obtained the best results in the least possible time.

Until within the last three years I treated all wounds and ulcers by cleansing and endeavoring to maintain asepsis, and stimulating whenever necessary. I faithfully used iodoform, later zeroform and nosophine. For local applications, when indicated, I curetted, used 1 per cent. sol. of formalin, pure phenol or tinct. iodin. With these, in most cases, satisfactory results were obtained; in others the reverse was true. In some obstinate cases, I secured nice results from the use of cassaripe in a 10 per cent. ointment, on which I reported in *Oph. Rec.*, Nov. '99. However, when all else had failed and not till then, I would resort to the use of the electro-cautery, which method of procedure I am led to believe after a visit to many of our Amer. Oph. hospitals, is still the common practice, i. e. using the cautery as a last resort. I asked myself the question: if these obstinate ulcers heal so nicely after using electro-cautery as the last resort, why not use it at first? The frequency in the use of the electro-cautery in my rhinological work has changed, with increased experience, in inverse proportion to its use in ophthalmological work.

The average simple non-infected corneal ulcer or wound will heal just as readily if it is simply protected, kept clean and let alone, as it would with the most energetic treatment. Therefore, the practice of many surgeons of touching all corneal abrasions with iodin or phenol or any stimulant is, to say

*Read before The American Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 10, 1903.

the least, superfluous, not to mention the pain and reaction that always follows. As to the physiological explanation of the results obtained by use of the electro-cautery, there might be much said, but whatever its method of action, experience has taught its use in a great many cases is essential to get best results.

Most of my accident patients come from the mines or smelters with a piece of quartz in the cornea. There is no means of judging whether the speck is simply rock or contains irritating compounds of copper, arsenic, etc.; in others slight abrasions have already become serious by contamination with copper water, which is a concentrated solution of sulphate of copper that saps through the rock above and dripping down on the miner's head gets into his eyes. If the wound be but slight, I either give nothing or a boric acid and zinc wash, instructing the patient to return in 24 hours; if there then be any irritation, I lightly touch the spot with the cautery at a very dull heat. This is usually all the treatment required.

For nearly three years past, in all corneal ulcers, no matter what the origin, if they appear severe enough to require any further treatment than a mild cleansing lotion, I invariably, after putting in a few drops of holocain, clean out any excessive amount of necrotic tissue with curette and use the electro-cautery. The results have been more satisfactory, considering time, reaction and suffering, than I obtained with any other method of treatment. I use a current transformer on the light current and a short straight cautery point, placed in the handle at angle of 45°. The point is heated to a dull red in most cases, though in some I do not reach even the degree of red heat. In the ordinary cases, the lightest possible punctures are made all around the edge of the ulcer just in the edge of the healthy cornea, punctures being about 1½ mm. to 3 mm. apart; also, when necessary, I touch any part in its floor that appears unhealthy. This latter procedure greatly hastens the healing process if there is any necrotic or unhealthy spots in the floor, but if it appears clean, this should be omitted. With few exceptions, this is all the active treatment necessary. If after a few days (say two to four) some places appear to have made no progress, these spots

should be re-touched. In the rare cases in which the ulcer does progress in some direction, the advancing portion should again be touched by puncturing just in the edge of the normal tissue; this acts apparently in the same manner by which prairie fires are controlled by burning an area in front of them.

I claim no originality as to the method of corneal punctures at the edge of ulcers. I first received the suggestion of it from Dr. Herman Knapp. He later demonstrated the method before the Oph. Sec. of N. Y. Academy of Medicine, Nov. 1900, as reported in Vol. xxx, Archives of Ophthal. I quote a paragraph from a letter received from Dr. Knapp under date of New York, March 9, 1903. He says: "I have tried this method ever since, and used it almost to the exclusion of any other procedure. It is only lack of time kept me from publishing the results of the method, which are in general very satisfactory, frequently surprisingly good. I have dozens of carefully recorded cases in my record books and shall publish them as soon as I can make time for it."

With children, I formerly gave chloroform, but now use only local anæsthesia. Spots in the conjunctiva require more holocain than in the cornea. Cauterization can be accomplished perfectly by handling the cautery with the same precaution we use the cataract knife, and touching each spot instantaneously. A speculum or a fixation forceps is usually not necessary. With this treatment the child requires nothing more.

In wounds of the cornea, when it has been completely perforated, cut or lacerated, and probably not aseptic, I touch the entire margin of both edges of the wound. If in apposition, this coagulates any exudate and forms a protective covering; it at the same time cements the edges together. To illustrate: Patient aged 65; prospector; struck in a saloon with a broken beer bottle at midnight. Consulted me at four P. M. next day; found vertical cut extending from 1 mm. above to 1 mm. below sclero-corneal margin, including the entire center of the cornea; protrusion of the iris above and below. I cut off both protuding portions of the iris with scissors, then cauterized full length wound thoroughly; this practically sealed it. Patient left next day for his cabin in the hills,

taking with him only atropine solution. Saw him next in six months' time; had no more pain; made nice recovery and had useful amount of vision.

To illustrate results obtained in severe ulcerations: Mrs. B. aged 63; wash-woman; ulcer covering a third of cornea; hypopyon extending up to pupillary edge. At first visit in my office, I used cautery. She walked home and returned third day; pus had disappeared; no pain; simply kept eye covered. She made an uninterrupted recovery.

On the evening of the same, Mr. P. aged 55, mining engineer, consulted me; was injured two weeks previously. The local condition was nearly identical with that of Mrs. B. Used cautery; extension towards the center of the cornea stopped but extended toward the periphery. Three days later I touched the advancing edge and opened the anterior chamber. I repeated this three times within nine days. Then he entered the Murray & Freund Hospital and was put to bed; second day pus was gone and he resumed work three weeks later.

Girl aged 2 yrs.; corneal ulcer; treated with phenol once; later iodin twice; with continued use of drops, and nosophene ointment, fully recovered after two months. When ulcer suddenly recurred, I applied pure phenol but did not check its progress; on the third day, under chloroform, used electro-cautery. No more active treatment, and now after three years, there is but the faintest nebula, not perceptible to her parents. This being the first time I used it on a child, and several almost similar cases following, induced me to substitute local anæsthesia for chloroform, and use the cautery as primary treatment. The time consumed from making a diagnosis till the patient is operated on and leaves the office does not exceed 10 or 15 minutes.

To illustrate its use in apparently simple cases: A child with a mere abrasion caused by a finger nail, was brought to my office on account of pain. I prescribed holocain, but on third day being informed the mother was compelled to use it several times each night, I touched the spot with cautery point barely at the temperature where it burns cotton (this is the test I use to regulate a black heat). After three hours, pain was gone and no further treatment was used.

Conclusions:—Whenever a corneal wound or ulcer is se-

vere enough to require treatment, electro-cautery is indicated. With proper appliances in careful, competent hands, its effects are absolutely controlled and is perfectly safe with patients of any age. The results are better, quicker, more certain, with less reaction and much less pain than can be obtained by the use of phenol, iodin, formalin or other strong stimulant. The scar resulting is no more and frequently much less than would have resulted had any of the so-called less radical means been employed. I have used it in a great number of cases; so far I have penentrated through the cornea but twice, and then without any bad results, and I consider it in every respect one of the most satisfactory operations performed in ophthalmic surgery.

DISCUSSION.

Dr. Gamble.— I think this is a very interesting paper. Dr. Donovan speaks of a solution of zinc and boric acid in treating these corneal ulcers. I would, myself, hesitate to use zinc in the treatment of a corneal ulcer. My experience is that we cannot use irritating substances, and our antiseptics are all more or less irritating. Zinc in my hands is a source of danger. I was glad to hear the essayist speak about the avoidance of scars. I have not been so fortunate. I think there is more danger with the actual cautery than with carbolic acid or nitric acid of producing scars. The action of these solutions is hindered by reaction of the tissues. With the proper use of carbolic acid or nitric acid, there are few ulcers we cannot control. It has been my experience that when the cornea is perforated it will take care of itself. I never have had occasion to cauterize the margins of wounds after perforation or incised perforating wounds. It might be that the infections from the mines would necessitate such treatment.

Dr. Suker.— The doctor is to be complimented on the excellence of his paper. He speaks of zinc sulphate and boracic acid; they are chemically incompatible. I would ask if he has tried the use of nitric acid. It is a stimulant and a cautery at the same time. You can limit its action as nicely as you can the electro-cautery. I think the conclusions he draws are good. If the electro-cautery, as a last resort in some

cases does good, it would accomplish the same as the "first resort."

Dr. Bradfield.— I do not believe zinc sulph. should ever be used in corneal lesions, as it is very irritating, and when an astringent is needed one should be chosen over which we have better control. In superficial infections of the cornea I very much prefer fuming nitric acid to the actual cautery, as it is much less liable to leave opacities.

Dr. Conkey, West Superior, Wis.— While the electric cautery is an excellent remedy it has its limitations. It will not always stop the progress of rapidly spreading septic ulcers. I have lost some eyes by depending entirely upon it. In these malignantly destructive cases it should be combined with free incisions through the ulcer. The anterior chamber should be opened and kept open till the ulcer begins to heal. The fluid from the anterior chamber seems to exert a some powerful antiseptic action upon the diseased surface than does the cautery.

Dr. G. F. Keiper, Lafayette, Ind.— I believe that taking all in all, the galvanic cautery is the best means we have at present for treating corneal ulcers. I recently cauterized an eye and re-cauterized it, and the ulcer continued to spread, and I then used nitric acid and finally iodine. I also recall a case where I was obliged to cover the place with normal conjunctiva in order to prevent the escape of aqueous according to the method of Kuhnt. As a rule a burn in the cornea is easier to heal than an ulcer.

Dr. M. D. Stevenson, Akron, O.— It is most important in using the cautery to apply it only momentarily and then remove it, reapplying it as often as necessary, much depending on the efficiency of the apparatus. The aqueous will become heated and cataract result, if it is held too long in contact with the cornea. When the base of the ulcer is thin, often presenting a slight bulge as if it is going to rupture, it is well to perforate it with the cautery, thus reducing the tension of the eye, and keep the opening patent until the eye is much improved. I always instill a weak solution of fluorescine into the eye to more clearly outline the ulcerated area. In ordinary round non-progressive ulcers I cauterize the area of first staining, but in one that is rapidly progressive in a

certain direction I also cauterize the area of second staining in the same direction, which extends 1 mm. or slightly more into the adjoining infiltrated cornea. A nervous patient should not be informed of its use, as through fear their co-operation may be lost and damage result. I have used nitric and carbolic acids, properly applied so that there was no excess to run over the cornea, much more frequently than the electro-cautery and consider that in ordinary cases they are as good and more easily and safely applied. The electro-cautery is not necessarily the best to use in all cases merely because it often is more useful in some of the severer types.

Dr. Jos. Titcomb, Duluth, Minn.— I believe cautery to be the best single agent we have. Personally I prefer the actual cautery by means of the platinum probe heated at the alcohol lamp. The cautery is the agent that does the work, and unless the ulcer is central, where there is possible danger of opacity, I almost invariably use it.

Dr. Heckel — I do not think any one doubts the efficacy of the electro-cautery treatment. I like to use carbolic acid in small ulcers. It gives very good results. In certain cases nothing will take the place of the cautery. This is especially true of the class of cases Dr. Donovan describes, where it is excellent treatment. The use of some germicidal agent in conjunction with the electro-cautery enhances its efficacy. I formerly used silver nitrate with good results, but now use protargol in solutions of 10 grs. to 20 grs. to the ounce. It is a good germicide and has a beneficial influence.

Dr. J. W. Scales, Pine Bluff, Ark.— I find that locality has a great deal to do with the result of treating corneal ulcers. I dare say that if the usual treatment was carried out in my part of the country that is usual in the hospitals of New York and other places, the majority of the eyes would be lost. I am speaking of the urgent case that comes to the specialist in that locality. In the first place, we have a man with a large spleen and cathectic diathesis, his liver inactive and in a general asthenic condition. Any sort of stimulation will be detrimental to that patient. You first have to rouse his secretion, and the best thing in Arkansas is calomel. I would not hesitate to give my patient, if the occasion were urgent, at least 20 to 25 grains of calomel in order to get an

immediate effect, that is, within a few hours. The average case would not, of course, take as large a dose. Until you get the slight reaction, which will be indicated by an increase in his appetite, which is the best indication we have of a stimulation in the liver, we are compelled to use palliative remedies. The best I think is hot applications. If we use the cautery we will get one result in one case and another in another. My patients do not pay enough attention to the diathesis.

Dr. Wilder.— I concur with the propositions of Dr. Donovan in the main. I cannot agree to his ultimate conclusion that because this treatment is good as a last resort, it is good as the first in every case. I do not believe that we should use this rather severe treatment in such a simple thing as a scratch of the cornea from a child's finger. In the hands even of a skillful person, the cautery will make quite a scar, and wherever you burn the cornea you will have a scar; if that happens to be central it may interfere with vision. I do not believe we should resort to this before we have tried antiseptic irrigations, etc. I do agree with him on the value of the treatment, and I rely less and less on carbolic acid and nitrate of silver in these cases. One practical point is that when the corneal ulcer has extended deeply, there will be a little knuckle of the membrane of Descemet sticking up like a little pearl. One may cauterize the advancing border, but the keratocele will remain and prevent the healing of the wound. Not until a puncture is made through the keratocele will the process stop. As Dr. Stevenson has said, we relieve the tension in these cases and accomplish just what is done by the Saemisch incision.

Dr. Donovan (closing discussion).— I use zinc, one to two grains to the ounce only, as a rule, and in that proportion it is hardly a stimulant; it is but a mild astringent. It has been said that the perforating wounds usually take care of themselves. It is true, a great many of them do. I do not mean to say that you should use the cautery when the cornea seems to be doing all right. But if you know it is infected, it is not well to wait to have it demonstrated. I did use nitric acid on several occasions, and I have forgotten just what my results were. I use the electric cautery so fre-

quently that I think I can do better than with nitric acid. It is not necessary to cauterize to the bottom to stop the infection. As a rule, I make the slightest possible punctures. I cannot get these patients to go to bed. I think every one with a sore eye should go to bed, but I cannot get them there. In spreading ulcers it checks them as a rule. I just touch the ulcer with the cautery as lightly as possible — just touch it and withdraw. I do not use fluorescine any more. As a rule the patient has diagnosed the trouble and outlined the treatment, and if the ulcer is extensive enough to need treatment, it shows. I consider the electro-cautery safe, but not to be used too freely in the center of the cornea. Boracic acid and zinc sulphate I do not consider incompatible. It makes an absolutely clear solution and you get an astringent effect from it.

TUBERCULOSIS OF THE IRIS, WITH PRESENTATION OF MICROSCOPIC SPECIMENS.*

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CHICAGO.

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SOME difference of opinion seems to exist as to the frequency if this disease. Wagner (*Münch. Med. Woch.*, 1891, Nos. 15 and 16) states that 50 per cent. of all cases of iritis are of this character. Michel (*Lehrbuch der Augenheilkunde*) also regards it as very common, and states that forty or fifty of every hundred cases of iritis are tuberculous. Both authors seem to include in their category all cases of serous iritis in which there are small masses of exudate in or upon the iris, that simulate in any manner tuberculous nodules. Horner estimates that it will not be observed more frequently than once in four thousand cases of eye diseases, while Hirschberg, of Berlin, saw only six cases of it among sixty thousand eye cases.

Velhagen (*Klin. Monatsbl. f. Augenh.*, XXXII p. 121) says that among eight thousand patients in the Eye Clinic at

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Göttingen, no case of tuberculous iritis was seen. With these latter opinions I think most ophthalmologists will agree, and we must conclude, therefore, that it is a rare affection. Probably early observers who had opportunity for examining such cases, considered them as either condylomata or sarcomata, or placed them in the category of idiopathic iritis; but with the invention of the ophthalmoscope and the discovery that tubercules develop in the choroid in connection with either general or meningeal tuberculosis, a more careful study of certain inflammations of the iris and ciliary body has determined their exact nature. Cohnheim demonstrated that tuberculous iritis can be caused by introducing particles from tuberculous lymphatic glands, granulations of tuberculous joints, etc., into the anterior chamber of the eye. More recently investigators have caused the disease experimentally by injecting pure cultures of the tubercle bacilli into the aqueous chamber. The introduction of small masses of suspected tissue into the anterior chamber of the eye of a rabbit is employed as a means of determining whether such tissue is tuberculous. About twenty or thirty days after the injection into the eye, small, reddish grey nodules make their appearance in the iris and the eye becomes inflamed. The nodules increase in number, coalesce and fill the anterior chamber with a mass of new tissue. The cornea becomes involved and the growth breaks through, thus destroying the eye. The animal usually dies from general tuberculosis.

Tuberculosis of the iris manifests itself in three forms:

First, Solitary Tubercle.

Second, Disseminated Tubercle.

Third, Simple, inflammatory tuberculous iritis (Michel).

The solitary growth affects one eye alone and develops as a small, round or oval nodule, usually at the periphery of the lower part of the iris. It is grayish red in color, and as it grows it fills the anterior chamber of the eye, and much resembles a neoplasm. Indeed such a mass may easily be taken for a sarcoma. This also goes by the name of granuloma, a term, according to Fuchs, that was given by von Graefe, "because Virchow who made the anatomical examination of the tumor designated it as granulation tissue." This term should be abandoned, for it is misleading and liable to create

confusion. As the growth increases, the cornea becomes involved and perforates, allowing the mass to break through, which presents as a pale yellowish or grayish mass similar in appearance to granulation tissue. It does not then continue to grow, but breaks down, and the eyeball gradually begins to shrink as the inflammatory process occasioned by the growth subsides. The eye is, of course, lost and phthisis bulbi ensues. General tuberculosis infection may result.

In the disseminated form which may occur in one or in both eyes, there are at first all the symptoms and signs of an iritis. Soon little yellowish grey nodules surrounded by a slightly reddened zone, appear in the iris. These vary in size according to the growth, but are from one to six mm. in diameter. Their favorite site is at the root or periphery of the iris, and they seem to be constantly changing, some disappearing while others are forming. Their predilection for the outer or root zone of the iris helps to distinguish them from the condylomatous nodules, so frequent in syphilitic iritis that usually are seen at the pupillary margin. Graefe describes them as of the size of millet seeds, distributed over the iris, especially over its lower half and some distance from the pupillary margin on the circulus arteriosus minor. Some of these tubercules may disappear completely, leaving small patches of atrophied iris, while others may coalesce, forming larger tuberculous masses that fill-in the angle of the anterior chamber.

The iris is dull and discolored, and flakes of lymph and disintegrated tuberculous nodules may fill-in and occlude the pupil. Firm and extensive adhesions form between the iris and the lens, and the tension of the eye may become markedly increased. Lubrowski (*Archives of Ophthalmology*, Vol. XXIX, No. 3) reports several cases in which glaucoma supervened. Ciliary injection is marked and the eye is very often sentive to pressure. The ciliary body and choroid may be invaded, and even the cornea may be involved, the tubercles presenting the same general appearance in that structure as in the iris.

As the case progresses, there may be bulging of the ciliary region and even perforation; or the process may subside with gradual shrinking and atrophy of the eyeball. Tuber-

cular meningitis or general tuberculosis may supervene, so that the prognosis, both general and local, is bad.

In the third form, according to Michel, the tubercules are not clinically demonstrable, being situated in the tissue of the iris and not on the surface. The disease assumes the form of a chronic iritis or irido-cyclitis, which causes either complete annular posterior synechia of the iris, or adhesion of its posterior surface to the lens. In the former, there would be iris bombée and more or less atrophy of the tissue of the iris. In the latter form there is proliferating inflammation of the iris which becomes hypertrophied, and granulation tissue fills the posterior chamber. The tuberculous nature of the trouble may be demonstrated by excising a piece of the iris and examining it microscopically for the existence of tubercle. Deposits of lime are frequently found in such irides, and even true bone formation has been observed as in the choroid.

Some observers, Leber (*Bericht der XXI. Versammlung d. Ophthalmol. Gesellsch.*, Heidelberg, 1891), Samelssohn (*Bericht der XXIII. Versammlung der Ophthalmolog. Gesellsch.*, Heidelberg, 1893), and Van Duyse (*Archiv. d' Ophtalmologie*, XII, p. 478), describe a form of attenuated tuberculous iritis, presenting all the salient features of the disseminated form, which may end in spontaneous recovery, the functions of the eye being partly or wholly preserved. This form is slower in its course and affects older persons.

All of the forms mentioned present the same histological features, differing in degree, namely the typical tubercle formation of round cells around a central giant cell. This giant cell is a large crescentic or round structure with non-granular protoplasm, containing near its periphery numerous elongated nuclei. The little tubercle mass is frequently seen on the wall of a vessel, and develops from the adventitia. This is one means of differentiating histologically a tubercular from a syphilitic node, for in the latter the growth begins in the intima and the lumen of the vessel is blocked. In the milder forms of the disease, the bacilli are very scarce and difficult to find. It is assumed, therefore, that in some of these cases the exciting cause is not so much the direct action of the bacilli as it is the irritation caused by the toxines generated by them, circulating through the delicate tissue of the

iris, which, for some reason, is unusually sensitive and susceptible.

This is a disease of childhood and adolescence, the large majority of such patients being under the age of twenty years. Of 121 cases reviewed by Schieck (*Graefe's Archiv. für Ophthalmologie*, Bd. 50, part 2, 1900) ninety-six were under the age of 20 years; while of the remaining 25, only six were over thirty years. The oldest was 55.

Most of the patients affected with tuberculous iritis have either pulmonary tuberculosis or tuberculous manifestations in other structures, such as joints, lymphatic glands or skin. Some have a bad family history, while a few have neither a family nor a personal history of tuberculosis, nor do they show any manifest signs of the disease, except in the lesion of the eye. Such cases raise the very interesting and important question, whether the iritis is primary or secondary to some other tuberculous lesion, and many capable observers take the view that it is primary. It is argued that the eye of a sound person may be infected locally through an abrasion of the cornea, or an ulcer of the cornea or conjunctiva, and that in such manner the bacilli may gain entrance to the deeper circulation of the eye.

DISCUSSION.

Dr. Alt.—Tuberculosis of the iris is a comparatively rare disease, although possibly more frequent than we know. The statement that from 40 to 50 per cent. of iritis are tuberculous, seems to be based on the paper of Michel, puplished in Graefe's Archives some 18 or 20 years ago, in which he tried to show that in iritis the inflammation is always a nodular one. At a certain stage this is really the case in many forms of iritis, but while the picture is suggestive of tubercles, these are not tubercles. It is due to the accumulation of leucocytes around all or at least a large number of the very many bloodvessels in the iris. While the specimens shown by the essayist are very fine and characteristic I believe that in modern times the diagnosis of tuberculous iritis is often made without a warrant. Personally, I have not yet seen a case, although I have seen some specimens which were certainly tuberculous.

Dr. Suker.—I would like to ask whether in the so-called acute variety the arrangement of the tubercles and cells is

similar to that in chronic tuberculosis, and whether or not the coalescence in the iris is as marked as in the single tubercules of the choroid. My experience in tuberculosis of the iris has been mainly experimental. If any of you wish to try it, you can take a small syringe and through a small corneal incision inject a pure culture of the germ. In 34 hours or later you will see the characteristic growth begin and you can watch it nicely. Rabbits are especially susceptible.

Dr. Jos. Beck, Chicago.— This case of Dr. Wilder interests me particularly from the histo-pathological point of view. I have been studying this specimen microscopically and have found some beautiful giant cells, characteristic of tuberculosis. I had the pleasure of seeing tubercular iritis and irido-choroiditis at Graefe's and Wintersteiner's laboratories. The differential diagnosis between syphilitic and tubercular iritis based on the presence of giant cells, when found alone, is not absolute, because one can find them in both the conditions. The endarteriitis obliterans in syphilis and the periarteriitis in tuberculosis are points of greater diagnostic value. Another point in the diagnosis is the reaction to tuberculin, which was not mentioned in the writer's paper, I believe. In Elschnig's case of tubercular irido-choroiditis the experiments with tuberculin were carried out and a reaction obtained.

Dr. M. D. Stevenson, Akron, O.— It is clinically important but often difficult to differentiate between tubercular nodules, condylomata and sarcomata. The former usually occur in young people with a tubercular history and their size, peculiar grayish white or yellowish gray color, and lack of bloodvessels help to distinguish them. The condylomata occuring in older people, with a history or signs of lues are usually quite small and vascular and quickly disappear under specific treatment. Non-pigmented sarcoma in old people is always single and very vascular, it steadily increases in size and never disappears. Microscopically this can be easily differentiated although all of the tumors may have giant cells. It is important to note whether the inner or outer coats of the vessels are chiefly affected.

Dr. Wilder (closing).— In reference to the point raised as to the giant cell and its differentiation from the giant cell of syphilis, one must bear in mind there are several varieties

of new growth in which the giant cells may be found. They are found also in sarcoma and may make one think of tuberculosis. But there is a way of telling them apart: the giant cell of tuberculosis is usually circular in outline or elliptical, rather symmetrical, while that of sarcoma is more angular, and irregular. It is the same in syphilitic forms. Another point is that the contents of the giant cell of tuberculosis are clear and non-granular, while those of sarcoma are granular. Also, the nuclei in the tubercular giant cell are peripheral and usually elongated, while the others are central. Another important differential histologic point is that in tuberculosis the growth begins in the adventitia, while in syphilis the process usually starts in the interna of the vessels. In regard to the reaction of tuberculin, I think it uncertain, at least it has been so in the limited experience I have had. I have had two cases in my own practice where there was no reaction after the use of tuberculin.

(Dr. Wilder showed a number of microscopical specimens).

MYDRIATICS IN REFRACTION OF PRESBYOPES.*

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SINCE the introduction of cycloplegiacs into refractive work, there has strangely existed, among ophthalmologists, a great diversity of opinion as to the necessity and advisability of employing these drugs as an aid in the determination of ametropic conditions. These contentions have been confined more particularly to the propriety of their use in the refraction of adults, while their employment in testing the presbyopic ametropes seems to be quite generally regarded as not only superfluous but attended with risk of inducing a glaucomatous condition. With a view of eliciting an animated discussion upon these points, I beg to present a few remarks upon the use of mydriatics in the refraction of presbyopic eyes.

When a patient presents himself for relief from an ametropic eye strain, be he young or old, the same difficulties of

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making an accurate estimation of the refractive condition of the eye, without the aid of a mydriatic, obtain to a greater or less degree. The variability in refraction of an accomodating eye, the dependence of a subjective test upon the uncertainty of a patient's judgment, the frequent latency of hyperopic conditions, the fact that a sphere will improve to a certain extent the vision in astigmatism (although this phenomenon is denied by many writers upon refraction), the additional observation that 90 per cent. of my refractive cases are astigmatic, one-quarter of a diopter or more, and most important, an inability of properly employing the objective tests as a means of corroboration have convinced me, after making several thousand refractions, that the aid of a cycloplegiac is not only necessary to the accomplishment of an accurate refraction of the young adult, but may be frequently employed with profit in the testing of presbyopic ametropes. Frequently is the statement made that it is not necessary to correct the smaller degrees of astigmatism when prescribing for an ametropic defect in the presbyopic. Such reasoning seems to be pregnant with anything but logical thought. With as much propriety might a physician consider his duty performed after administering a quieting potion to relieve a chronic disorder. If it is necessary to correct an ametropia at all, why burden a patient with a glass that removes only a portion of his trouble, when every vestige of strain and discomfort might be eradicated thereby? It is frequently the presence or absence of these small defects that decides the comfort of the patient.

To briefly illustrate the validity of my position with reference to this subject, I will cite a few instances in which a satisfactory refraction was not obtained until a mydriatic was used, when both the subjective and objective methods of testing were employed, the findings of the latter being usually preferred.

Case 1. Mrs. C. R. W., aet. 49, consulted me for the relief of marked refractive symptoms from which she had suffered for several years, although she had repeatedly been fitted with glasses by different oculists. Vision was normal, conjunctiva chronically injected, blepharitis marginalis present, and general health greatly impaired. When she called upon me, she was wearing +1.00 sph. before each eye.

Without a mydriatic she accepted O. D.+1.00 sph.+0.25 cyl. ax. 60°; O. S.+1.00 sph.+0.25 cyl. ax. 120°. Not obtaining complete comfort from the use of these lenses, the eyes were homatropinized, when +0.75 sph.+0.50 cyl. ax. 60° was selected for the right eye, and +0.88 sph.+0.37 cyl. ax. 120°. for the left, which was worked out principally by means of the skiascope, as the subjective tests were uncertain. An additional +1.50 sph. was given her for reading, with instructions to wear the distance glasses constantly. Though several years have elapsed, this same ametropic correction is being worn with complete satisfaction, and attended with a marked improvement of her physical condition.

CASE 2. Mrs. R. C., aet. 66, was referred to me by her physician for refraction. She had been unable to obtain relief from constant headaches and blurring of print from which she had suffered for two years, although she had worn several different lenses. Vision in O. U., $^{20}/_{60}$, was improved to $^{20}/_{20}$ by a 2.25 sph., which she was wearing. A subjective test, without a mydriatic, was attended with uncertainty as to the exact amount and axes of the existing astigmatism. Under homatropin, both of these points were decided without any difficulty, when she accepted in O. D.+2.00 sph.+0.75 cyl. ax. 180°, and in O. S.+2.00 sph.+0.50 cyl. ax. 180°, which was corroborated by the shadow test, giving a vision of $^{20}/_{15}$ in each eye. A+3.00 sph. was added in a pair of grab fronts for her presbyopic condition. Complete relief from her symptoms has been enjoyed since wearing these corrections during the past two years.

CASE 3. J. F. S., aet. 60, since a young man has had poor distant vision, pain in eyes, and blurrring on reading, from which he has never been relieved, although he has often been fitted by several refractionists. Vision was $^{9}/_{200}$ in O. D., and $^{8}/_{200}$ in O. S. Was wearing —6.00 sph. for distance and —4.00 for reading. Subjective tests gave —6.00 sph.—1.50 cyl. ax. 115° for the right eye, while —7.00 sph. —1.50 cyl. ax. 60° was selected for the left, giving $^{20}/_{60}$ in O. U. A deduction of 3.00 diopters was given him for reading. After a trial of these lenses, which was not satisfactory, homatropin was instilled, when objective tests showed that the proper correction for the right eye was —6.00 sph.—2.50 cyl. ax. 120°, and —7.00 sph.—2.00 cyl. ax. 60° for the left,

which gave a vision of $^{20}/_{40}$. Together with an appropriate correction for near work, these corrections have produced a cessation of all his refractive symptoms since wearing them.

If space permitted, these typical cases might be augmented by the citation of a large number of similar instances, which have come under my observation and care. The difficulties of making subjective estimations as previously indicated are all illustrated by the above cases, and as the presbyopes, whom I usually meet, are from a distance and have generally consulted refractionists of more or less ability, if the usual methods of testing show any uncertainty in results, I do not hesitate to place them under the influence of homatropin, when a certainty of refraction is apparent. In following this procedure, I am actuated by a desire to please my patients in the removal of their distressing symptoms, and thereby further my reputation.

In regard to the risk incurred by the employment of homatropin in presbyopic eyes, it is scarcely necessary to add that, in my opinion, this matter has been greatly exaggerated by many writers, although as a routine, I employ a myotic to neutralize the effect of the mydriatic. Among the thousands of presbyopes, who, in clinical and private practice, have had *atropin* instilled into their eyes for weeks and even months at a time in the treatment of corneal and iritic disorders, how many have terminated in a glaucomatous condition? We employ mydriatics in these conditions with scarcely a thought of danger, but when suggested as an aid in the refraction of presbyopic ametropes, what a poteney for harm it suddenly assumes in the minds of some! A reference to the literature of glaucoma reveals the citations of many instances resulting from the use of mydriatics, while a further search will show that cases have followed the instillation of eserine. Such contradictory evidence to my mind points to the purely incidental development of the glaucomatous state. Our present knowledge of the etiology, pathology, and in many respects even the treatment is quite uncertain as will be found upon investigation of the writings at hand, and until our knowledge upon these cardinal points becomes more definite and certain, can these harmful properties be justly attributed to the employment of mydriatics? I have yet to meet an instance in which the supposed increase of tension, or any other deleter-

ious condition has resulted from my use of the drug, either as a mydriatic or cycloplegiac. If the agent is employed as I have previously indicated, followed by a myotic, I am confident that our results in the refraction of presbyopic ametropes would prove more satisfactory, and the risk incurred practically nil.

DISCUSSION.

Dr. Suker.— This question of mydriatics is very interesting. I am glad to know that the doctor has become so expert that he can recognize with the retinoscope the difference between ¼ and ⅛ diopter of astigmatism.

In regard to using atropine, as I have already stated, the ciliary muscle is constantly active; it does not undergo the sclerosis the lens undergoes. Therefore, the ciliary muscle, though still active, can not change the convexity of the lens. Beyond 65 years of age we know that atropine has no effect upon the manifest accommodation. The lens does not expand in its anterior-posterior diameter, though the ciliary muscle may or may not be paralyzed. Hence, if you get a complete paralysis, the refractive condition is not changed and the range of accommodation is not changed; therefore there is no reason for using atropine in these cases. Beyond the age of 45 I see no legitimate reason for the use of atropine in determining any kind of refractive error, excepting a temporary mydriasis for retinoscopic purposes.

Dr. Bradfield.— I have no fault to find with the thorough examinations in refraction. It may rarely be necessary to use a cyclopegic after fifty years of age, but when done I insist that the proper glasses must be selected after the cyclopegia has entirely disappeared.

All the result produced by correcting low degrees of astigmatism in the presbyope, wearing plus 2.00 or stronger spheres, is purely in the mind of the operator, as a slight tilting of the glasses will much more than counteract the effect.

Dr. Minor.— I am very glad to hear the paper, for the doctor finally come to my way of thinking, after all. He did not agree with me last year when I said that I invariably used homatropin in every case of refraction, no difference about the age of the patient. I have yet the first time to find an increase of tension produced by it. I have read about it,

but although I have looked for it, I have never found it. The doctor told me that very often, if not always, he uses a drop or two of eserine in these presbyopes after the homatropin. This I do not find necessary. As for correcting astigmatic defects, I think this is highly necessary, and that is where the careful refractionist gets the good results in his work. I have cases every week refracted by other men who disregard this astigmatism, and I find that if I correct ½ or ¼ diopter of astigmatism that the glasses are satisfactory to the patient.

Dr. Gamble.— I think that the conclusions of Dr. Griffin's paper should be emphasized, and I believe thoroughly in every conclusion he has reached. I am not speaking from a theoretical point of view but from a clinical one. It has been my custom for two years to put homatropin in every presbyopic eye that comes to my office to be fitted. If there is any evidence of astigmatism, unless there is some contraindication. I think the use of homatropin is especially valuable in determining the required lenses in presbyopic cases for the purpose of revealing the astigmatism. I never feel sure the patient has a perfectly fitting lens until I have used the retiniscope. It is difficult to get a subjective test revealing the amount and axis of astigmatism, which is accurate. It differs with the personal equation of each patient. I do not see any objection to using the objective method, and you cannot get this without a cycloplegic. When through, you have the best possible result that can be attained.

Dr. M. D. Stevenson, Akron, O.— Always feels greater confidence in his result after the use of homatropin in presbyopes, and especially when he also gives a post-cycloplegic examination. He does not use it in all cases, and never when contraindicated by increased eyeball tension. His method is to instill ten or twelve drops of a 1 per cent solution in the eyes every five minutes (the patient waiting in a quite dark room), and commence the examination in from fifteen to thirty minutes after the instillation of the last drop. No trouble has so far resulted from their use, although eserine has occasionally been used after the examination as a preventive. Most all presbyopes have some accommodative power, and, if hyperopes, will usually demand too weak a lens. In photoscopy which the writer considers much the best objective method of examination, the refractive strengths of these

eyes without the use of a cycloplegic, are often noticed to vary much depending on their accommodation.

Dr. Griffin (closing discussion).— Dr. Suker compliments me upon my ability to diagnose between ¼ and ⅛ diopter with the skiaskope. I do not consider this as anything extraordinary, although I must say that these results are not obtained by a careless use of the method. Accuracy in this mode of testing is a matter of personal equation as in other methods of refraction. With the eye under a cycloplegic, I first use the subjective tests, and then the shadow method. In a comparison of results, with few exceptions, the patient accepts my findings of skiascopy as the best. This is not due to careless use of the subjective tests, but to the uncertainty of a patient's judgment. Normal vision through a lens, with or without a complete suspension of the accommodation, does not positively exclude a remaining ametropia. The doctor tells us that at 65 years of age the accommodation is suspended physiologically, but theory is one thing and facts are another. I have had patients 65 years of age where I could not make a reliable refraction without the use of a mydriatic; and even at 70, I have observed a variability in the tests. I recall a patient of 50 years, who complained of marked refraction symptoms, but so far as the subjective tests were concerned, no error was evident; though under homatropine, a compound hyperopic astigmatic condition of moderate degree was easily shown. Dr. Bradfield says that the patient does not accept the correction made under a mydriatic and the dilated pupil presents a different refraction than a normally contracted one. That is true in some instances of marked spherical aberration, but I overcome this defect by employing a perforated disc as previously indicated, whereby a central refraction corresponding to the normal pupil is made. Of course, that is done as a last test, when finally deciding between the subjective and objective findings. It is results that speak. It may sound all right to say that it is not necessary to correct ¼ to ½ diopter of astigmatism in aged people; but when they come to the refractionist without this correction, and a remedying of these small defects results in a perfect cessation of the patient's former symptoms, which continues for years, I contend that it is not all imagination that produces these results. Again I say, results speak for themselves.

KERATOCONUS, ÆTIOLOGY, AND IMPORTANCE OF EARLY DIAGNOSIS AND TREATMENT.*

By J. A. L. BRADFIELD,

LA CROSSE, WIS.

EARLY in my experience in special work my attention was very forcibly called to the meagerness of the articles in our text books on the subject of keratoconus and the paucity of the subject in our general medical literature. Time has convinced me that it is much more frequent and of more importance than generally considered.

I do not come before you with a large clinical experience all classified and tabulated, but will deal with the subject from my own experience; and if, after the reading of this, the paper is unhesitatingly criticized and the subject thoroughly discussed, the object of the writer will have been accomplished.

The paper will be limited to the typical keratoconus characterized by ecstasia of the cornea just below and to the inner side of the optical center. Keratoconus is a disease having its origin at puberty and characterized by asthenopia and gradual failing of vision both far and near. It occurs more frequently in the female, is usually binocular and often originates in the hypermetrope. In many cases it soon reaches a stasis and leaves only a slight irregular astigmatism to mark its demise. In others it is much more serious, leaving not only a slight cone, but great irregular astigmatism with myopia and accompanying low vision; while the exaggerated cases have a well marked cone protruding between the lids and almost blindness.

It is sometimes found in the rhachitic subject, but oftener in the nervous, chlorotic individual, and some fault with the general system is always present. The nervous phenomena common to puberty being the most important.

The specific ætiology is unknown. The intraocular tension is not above normal and the thinning of the cornea results from the increase in area and corresponding thinning of the membrane. There being a fault in the general nutrition of the eye, the tonicity of the cornea is insufficient to resist the

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normal intraocular pressure, and hence the giving away of the least protected portion of the organ by the palpebra and extrinsic muscle of the eye, which is the point just below and to the inner side of the center of the cornea.

When the process has once begun the error of refraction resulting therefrom causing increased effort at accommodation, increases the progress of the disease, which, if the cause is not removed, hastens the eye to destruction.

When the disease is well advanced the diagnosis is easily made by the dark disc in the pupil reflex, the small and irregular corneal reflex or the irregularity of the rings in Placido's disc. When the ectasia becomes a staphyloma it can easily be seen, as it protrudes between the lids.

As the success in treatment depends on an early diagnosis which is very easily omitted, finer points in diagnosis must be found. As the center of the ectasiæ always occurs to one side of the optical center of the cornea, astigmatism is always present and also the meridians of least and greatest curvature are not at right angles. It is here that the ophthalmometer is invaluable. It not only shows the astigmatism, the variations from right angles of the principal meridians, but the variations with different stages of dilatation of the pupil and the course of the disease whether progressing, retrograding or at a stasis.

When vision and refraction are found to vary with different sizes of the pupil, accompanied by variation in the location of the axes of the cylinders, keratoconus should be suspected and can only be confounded with keratectasia, resulting from corneal lesions, the history of which is generally sufficient to determine the diagnosis, but when not, a little time and careful observation will do so.

With an early diagnosis and appropriate treatment, prognosis is good, the disease not only being brought to a stasis but considerable ectasia reduced to normal cornea. When more advanced, much improvement can be made, but vision will not be brought back to normal with correction of refraction, and ocular weakness will always remain.

When well advanced and the ectasia has become a perceptible cone, treatment yet is very valuable, but the preservation of good and comfortable vision is not possible.

Treatment should begin by correcting any errors in the general health and following good hygienic principles. Second, rest of the eyes from all use requiring prolonged accommodation. Third, correction of errors of refraction by appropriate lenses. Here care and judgment is required, as the refraction will vary very greatly with the different stages of dilatation of the pupil. The proper glasses should always be determined without the use of a mydriatic, care being taken to have about the same degree of light as in which the patient will work. Owing to contraction of the pupils in accommodation, sometimes very different lenses are required for distant and near use. In the early stages when the ectasia is progressing or retrograding, frequent changes of lenses will often be needed. Plus cylinders are usually but not always best.

In the early stages before the cornea has become very much thinned, local applications of the crystal of alum should be made to the affected portion of the cornea. After cocaining the cornea a smooth piece of alum should be gently passed over the cornea from one to half a dozen times, as experience teaches. This leaves a very soothing sensation and should be continued from once a day to two or three times a week till the ectasia is reduced or no longer improves. If after treatment is stopped the ectasia should return, the same treatment should be continued.

In the more advanced stage when the cone becomes visible and the center thinned, myotics and iridectomy are valuable but cauterization penetrating the entire thickness of the cornea is much more valuable, subsequently making iridectomy where it will give the best optical results.

To summarize: Keratoconus is often a self limiting disease. In the early stages the process can not only be stopped, but the resulting ectasia reduced and sometimes entirely removed, leaving a normal eye. When advanced the trouble can only be ameliorated and good vision never restored. When a high degree of ectasia has occurred, but poor vision at best can be preserved. Hence the importance of an early diagnosis and of acquainting the subject with the seriousness of the disease and of the importance of early and thorough treatment.

BOOK REVIEWS.

1. FESTSCHRIFT FUER GEHEIMRAT, PROF. D. V. MANZ, Freiburg, AND GEHEIMRAT, PROF. D. H. SATTLER, Leipzig. BEILAGEHEFT ZUM XLI. JAHRGANG DER KLINISCHEN MONATSBLAETTER FUER AUGENHEILKUNDE. Stuttgart, 1903. Ferdinand Enke. Price 14 marks. (COMPLIMENTARY NUMBER. A SUPPLEMENT TO THE XLIth VOLUME OF THE KLIN. MONATSBLAETTER.)

This number consists of two parts, one as a congratulation offering to Professor Manz at his 70th birthday, and one in commemoration of the 25th anniversary of Professor Sattler's professorship. Most of the papers are written by the former pupils and assistants at the eye clinics of Freiburg and Leipzig. The numerous subjects treated are of the greatest interest and refer to the histology, pathology and physiology of the eye. The illustrations (34 in the test and 19 plates) are excellent. Every oculist should study these important contributions to our literature.

2. SQUINT, ITS CAUSES, PATHOLOGY AND TREATMENT. By CLAUDE WORTH, F.R.C.S., London, 1903. John Bale, Sons & Daniellson. Price 6 shillings.

This is an interesting and very complete text-book on squint, with many original points and a description of the author's own method of muscular advancement. The illustrations are numerous and useful; by one of those strange mishaps in printing and proofreading the author's own original drawing on page 208 happens to be upside down. A large number of cases are cited in elucidation of the points set forth. Students and oculists will read this book to great advantage.

THERAPIE DER AUGENKRANKHEITEN (Ocular Therapeutics), By DR. VICTOR HANKE. Wien & Leipzig, 1903. Alfred Holder. Price 3,20 marks.

In this little book the first assistant of Prof. Fuchs' Clinic in Vienna has presented the manner in which the different affections of the eye are treated at this clinic. Such a

little book cannot fail to prove of great interest, and students and physicians will find it an excellent guide both as to diagnosis and treatment of the various eye affections.

Manual of the Diseases of the Eye for Students and General Practitioners. By Chas. H. May, M. D. Third edition, revised. William Wood & Co., New York, 1903. Price $2.00.

If the rapid sale and popularity of a book are an index as to its intrinsic value — and with scientific works this is probably the case — the author of this Text-book can certainly feel gratified, as this is the 3d. edition of the book, the first appearance of which we noticed in 1900. Numerous alterations and additions and some new illustrations make it more useful even than it was.

Diseases of the Ear. A Textbook for the Practitioners and Students of Medicine. By E. B. Dench, Ph. B., M. D. Third edition, revised and enlarged. New York and London, 1903. D. Appleton & Co.

This new edition of the well-known textbook deserves the same success its predecessors have had. It is an exhaustive treatise not only for students and practitioners of medicine as the title modestly states, but for students of practitioners of otology more especially. It needs no praise from us.

Arteria Uterina Ovarica. The Utero-Ovarian Artery or the Genital Vascular Circle. By Byron Robinson, B. S., M. D. Chicago, 1903. E. H. Colegrove. Price $1.00.

An excellent description of the anatomical relations of the utero-ovarian artery, with very numerous and mostly excellent illustrations. No pains seem to have been spared to make the subject clear and the result of the author's careful labors is this atlas which should be in every surgeon's library.

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ORIGINAL ARTICLES.

KERATOCONUS, ÆTIOLOGY, AND IMPORTANCE OF EARLY DIAGNOSIS AND TREATMENT.*

By J. A. L. BRADFIELD,
LA CROSSE, WIS.

DISCUSSION.

Dr. Alt.—What does the doctor expect from the application of alum, and in what proportion of cases has he seen a decided effect of it on the corneal tissue? I do not understand the possible effect. If it is used strong enough to harden the tissue of the cornea it would interfere with its nutrition and, perhaps, might produce sclerosis with beneficial effect. But I doubt even this possibility.

Dr. Suker.—I would like to ask the doctor if he considers keratoconus identical with keratoglobus, and whether it may not be a congenital condition. I would like to say that it is not always so, nor always binocular. Not much was said about the tension of the eyeball, or whether an iridectomy is of any avail. Would like to ask the doctor about his experience with eserine in these cases.

Dr. O. A. Griffin, Ann Arbor, Mich.—In reference to the correction of refractive errors in this condition, the doctor says that we should not use a mydriatic. It seems to me that in the weakened state of the cornea, the refractive condition should be as carefully estimated as in any other case, espec-

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ially if the patient is young. The spherical aberration which is increased in these cases with dilatation of the pupil, may be counteracted by placing a disc before the eye with a perforation corresponding to the size of the normal pupil, through which the patient sees. An estimate of the refraction made in this manner brings out all the latent defect, with none of the disadvantages of mydriasis.

Dr. Wilder.—When it comes to the point of cauterizing the tip of the keratoconus, it of course means that we will have a scar which will interfere with central vision. I had one experience where I had fairly good results by making a crescent-shaped cicatrix at the base of the keratoconus. The contraction of this cicatrix seemed to cause a flattening of the top of the cone, so that vision was markedly improved.

Dr. Bradfield (closing discussion).—The discussion of this subject and questions asked confirm my supposition and give the opportuny to present to the Academy my views more fully.

My observation is limited to my own private practice, and only having about 8,000 cases to draw from, I frankly admit that my conclusions should not be taken as final, but only ask that they be given their proper place.

In reply to Dr. Alts's question will say, that just how the alum affects the cornea I do not know; but I do know that in the proper cases under its use the ecstasia disappears as is demonstrated both by the ophthalmometer and the refraction. One case treated over a year ago in which vision was $^{20}/_{80}$ in the left eye, $^{20}/_{25}$ w.—150$\bigcirc$—1.00 ax. 135°, the ophthalmometer showing the two principal meridians markedly at variance from right angles, now has a vision = $^{20}/_{20}$, accepts a plus 0.75 sphere, and has almost a perfect cornea shown both by the ophthalmometer and the refraction.

In answer to Dr. Suker's question, I will say I do not think keratoconus is ever congenital; I never saw a case before puberty, and do not think it related at all to kerotoglobus.

The conclusions from my observation on keratoconus which I wish to present to the Academy may be summed up as follows:

Keratoconus results from disturbance in the general system affecting the nutrition of the cornea, of which the

nervous phenomena of puberty are the most important. Attention to the constitutional trouble is the most important part of the treatment. While the cornea is in this plastic condition applications of alum will reduce the ecstasia, but after the disease has come to a stasis it will be of no use.

When the ecstasia has advanced till it has become staphylomatous and the center thin, only a radical operation, as cauterization or excision, is of any use.

Many cases of keratoconus recover spontaneously before any perceptible cone results, but owing to the irregular astigmatism left, require special attention in correcting errors of refraction, owing to the different refraction of different portions of the cornea as the pupil varies in size. To be successful, treatment must be begun early and continued till the cornea recovers its proper nutrition and tonicity.

PAMPHLETS RECEIVED.

"A Note on the Histology of Vernal Conjunctivitis" by G. E. de Schweinitz, M.D.

"The Influence of Consanguinity on the Organs of Special Sense," by L. W. Dean, M.D.

"Amber Yellow Glass in the Examination and Treatment of Eyes," by H. H. Seabrook, M.D.

"An Unusual Case of Spontaneous Bilateral Haemorrhage from the Ear," by M. A. Goldstein, M.D.

"An Ophthalmic Clinic in the Hospital of the University of Pennsylvania," by G. E. de Schweinitz, M.D.

"Phlyctenular Ophthalmia in the White and Black Races, with Notes on its Local Treatment," by H. D. Bruns, M.D.

"The Histology of Bulbous Keratitis in Glaucomatous Eyes," by G. E. de Schweinitz, M.D., and E. A. Shumway, M.D.

"Concerning a Possible Etiological Factor in Tobacco Amblyopia Revealed by an Analysis of the Urine of Cases of this Character," by G. E. de Schweinitz, M.D., and D. L. Edsall, M.D.

OPTIC NEURITIS (BILATERAL) COMPLICATING WHOOPING COUGH.*

By WILLIAM E. GAMBLE, B.S., M D.
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A DILIGENT search into the literature has revealed reports of three cases of optic neuritis complicating whooping cough. I have thought it best to give the full report of these cases, in addition to report of my own case, and have also included an abstract of a case of ischemia of the retina, coincident with this disease, for reasons given below.

Alexander's[1] Case II: "Girl, 12 years old (still under treatment), totally blind, Oct. 3, 1887. Whooping cough preceded blindness two weeks and accompanied by intense headaches. On Sept. 15 the girl noticed that everything grew darker, and on Oct. 3 was totally blind. Pupils rigid, no reaction, either consensual or accommodative. Cornea, iris, nothing abnormal, but ophthalmoscope revealed in the fundus of both eyes optic neuritis.

Under treatment blindness decreased, and Nov. 1 was able to count the fingers at a distance of 8 inches. Middle of Nov., still better and decrease of optic neuritis. Whether there will be complete recovery, cannot be said on account of advanced stage of atrophy of the optic nerve."

Jacoby's[2] case I: "Girl, 6 years old, consulted with Dr. Hohlich, Nov. 15, 1888. Patient has had different diseases; when two years old, pneumonia accompanied by convulsions. From that time child complained of pain in the occiput. The other children in the family have passed recently through all the stages of whooping cough, and are recovering. For some weeks the child has suffered from spasmodic cough and occipital pains. The day before yesterday the child asked her mother why she remained away so long, as it was getting dark. This aroused the mother's attention that the child was becoming blind. Next day the patient was examined by Dr. Gruening. His findings were, dilatation of pupils ad

*Read before the American Academy of Ophthalmology and Oto-Laryngology at Indianapolis, Ind., April 10, 1903.

maximum; no reaction to light or convergence; bilateral neuritis without hemorrhages in the opticus; sensibility as to light quantitative. Another examination revealed that the vision was limited to right eye and that she was able to distinguish larger objects, like a watch, at a distance of 5 inches. Child examined again on 18th. Reaction of left pupil and larger objects could be seen with both eyes. Vision improves gradually. Was normal on Nov. 28. Ophthalmoscopic examination was negative. Since that time child is all right."

Callan's, P. A.,[3] Case III: "Kate M., aged 11 years; patient undersized and not strong for her years. When 6 years old had a very severe attack of whooping cough, lasting three months. Patient was much reduced by severe whoops and mother feared for her recovery, she was at times so prostrated. At the end of three months of the disease the whoops suddenly ceased, but a very dangerous complication arose, viz., brain trouble. Patient on attempting to walk would become dizzy and stagger, complaining of severe headache and pains in the joints and all over the limbs. Mind wandered at times. Was obliged to remain in bed for three weeks and at the end of that time her headache and dizziness left her, but she could only see very imperfectly. The mother, who was not a very intelligent person, noticed that the child in walking would run against tables and chairs, showing plainly that she did not see well.

"Patient was examined by a very competent oculist, who told the mother that "the eye nerves were swollen" (optic nerves).

"For some months there was improvement in the girl's sight, but this failed her again. At the present time there is well marked white atrophy of both discs. V. R., movement of hands before the face, V. L., fingers at 8 feet.

"Here we have a case in which a long continued attack of whooping cough brought about a passive congestion of the brain, with edema. This led to choked discs and subsequently to atrophy."

Dr. H. Knapp[4] reports a case of retinal ischemia in whooping cough in a boy 3 years old; total blindness, no hemorrhage in fundus or subconjunctival. Dr. Knapp be-

lieved the ischemia due to hemorrhagic effusion into sheathes of the optic nerves, or general anæmia. Paracentesis; improved vision.

Boy died three months later with pneumonia, as had been predicted by Prof. Loomis. This abstract of the case is reported because of the theory of pathogenesis advanced.

Author's Case:* Oct. 21, 1902, Ida B., aged 8 years, came in my service at the Illinois Charitable Eye and Ear Infirmary on account of subconjunctival echymosis of the right eye. Her mother gave me the following history: Four weeks before, the patient contracted whooping cough; has been whooping last two weeks. The coughing seizures, she says, are very severe; has six to eight during the night and fewer during the day. The mother says she is perfectly well excepting when she coughs. Has a good appetite; plays out of door as usual; sleeps well excepting when the seizures occur. She has never had any illness save an attack of measles two years ago, which left no sequelæ. She has never had convulsions. Does not complain of headaches excepting immediately after coughing spells for a short time.

The patient is the youngest of thirteen children, eight of whom are living and well; the others died of "lung fever" and other diseases at different ages. The mother is a well preserved, healthy woman. Father's health is good. The patient is a rosy-cheeked, well developed girl with no discoverable evidence of illness except during attacks of coughing. No motor disturbances to be found; possibly deep reflexes slightly exaggerated. Sense of hearing and smell normal.

Examination of the eye: R. V. $^{20}/_{15}$, L. V. $^{20}/_{15}$. Inspection of the right eye, aside from the subconjunctival ecchymosis, showed dilatation of the pupil, which responded to accommodation and consensually; to direct light very feebly. My colleague, Dr. J. Brown Loring, on making the ophthalmoscopic examination of the fundus, called my attention to the slight blurring of both discs.

Oct. 25. Patient presented herself, having ridden on the street car and walked together a distance of four miles. V. R. and L. $^{20}/_{15}$. Right pupil still dilated and responding feebly to direct light. Optic discs more blurred. Slight

*This case (by invitation) was reported at December meeting of the Chicago Pediatric Society.

amount of exudate in the retina below the disc, obscuring the temporal branch of the inferior branch of the central artery of the retina at one point. Analysis of the urine, both chemic and microscopic, negative. Temperature 99.2; pulse 80. Seems well.

Oct. 30. Ecchymosis gradually disappearing. V. R. and L. $^{20}/_{15}$. Right pupil responds to light better today. Neuritis more pronounced. Patient does not now have nor ever has had double vision. Temperature 99.2; pulse 80.

Nov. 6. No change in condition of the patient, excepting that neuritis is more pronounced, and temperature higher, 100° F.

Dec. 2. V. R. and L. $^{20}/_{15}$. Ecchymosis gone. Pupils respond normally to light and accommodation. Examination of urine, both microscopic and chemic, negative. Neuritis more pronounced. Mother says the child plays and acts in every way perfectly well. Whooping cough subsiding. Temperature same as at last visit, 100 F.

Jan. 15, 1903. Seems well, but has increased temperature, 99.5° F. Pulse 80; coughs occasionally; V .R. and L. $^{20}/_{15}$. Fields for red and green normal. Had difficulty in getting the peripheral fields on account of inability of the patient to appreciate the test; however both seem about normal. Discs still swollen; retinal pigment somewhat disturbed.

A blood count by Dr. E. V. L. Brown, Asst. Pathologist of the Illinois Charitable Eye and Ear Infirmary, and Dr. W. K. Spiece, was made with the following findings: "Reds," 4,966,800; "whites," 10,000. Therefore, whites to reds as 1 to 496.

The blood examination, as well as the general appearance of the patient, show that anemia is not the cause of the neuritis.

March 4. Temperature normal. Pulse 76. V. R. and L. $^{20}/_{15}$. Patient attending school; good appetite; apparently well—however has an occasional coughing seizure. Right disc slightly swollen, but evidently well on in regressive stage. The left disc slightly pale, but no swelling present.

May 20. Swelling of discs entirely gone; a perceptible amount of connective tissue at site of exudate on vessel described above; also a decided deposition of connective tissue in discs V. R. and L. = $^{20}/_{20}+$.

Prognosis in this case cannot be definitely known at the present time, but it is altogether probable that good vision will remain.

Analysis of findings in the above cases: A study of these four cases shows that optic neuritis occurs in girls, beginning about the 14th day of the convulsive stage in half the cases, opportunity for observing these cases being good; while in the other two cases the complication followed "after some weeks" and after "four months," the evidence being not so reliable.

Evidence of cerebral trouble—"intense headache" and "severe headache, dizzy, would stagger, mind wandered"—present only in half the cases. Ophthalmoscopic findings of the three authentically reported cases show optic neuritis without hemorrhage in the opticus. In only one case (author's) was exudate in the retina reported. In Dr. Callan's case ophthalmoscopic findings were not given except the expression "swollen eye nerves."

Disturbance in motility of the iris reported in all of the cases; in three vision was greatly reduced, while in the fourth there was no disturbance perceptible.

Perfect restoration of sight followed in one case (Jacoby's), while normal vision is present in author's case and but little disturbance of sight is probable. In Alexander's case, vision improving but no final report made; while in the Callan case white atrophy followed with quantitative vision.

Optic neuritis with and without cerebral complications, as above stated, suggests the probability of the cause not being the same in all cases. In sudden hemiplegia, aphasic disturbances, hemianopsia, etc., coming on during the coughing attacks, modern authors almost unanimously give the credit to "mechanical influences," that is, rexis, with the accompanying hemorrhage into the brain and cerebral meninges, and other circulatory disturbances.

The tetanic expiratory movement which characterizes the coughing attack in this disease, increases the intra-venous pressure to such an extent that rupture of the smaller veins and capillaries occasionally occurs, producing the above results, in the same way that sub-cutaneous and sub-mucous ecchymoses are seen in the skin and mucous membranes. The

optic "nerves" may become involved in such complications when menengitis ensues in the form of a descending neuritis.

In the above four cases reported, three of optic neuritis and one of ischemia of the retina, an attempt at giving the pathogenesis is made by Knapp and Callan only. Knapp explains the case of ischemia of the retina as being probably due to "hemorrhagic effusion into the sheaths of the optic nerves;" while Callan believes that "long continued attacks of whooping cough brought about a passive congestion of the brain with œdema; this led to choked disc and subsequently to atrophy."

In this connection it might be well to mention a case reported by Sebrigondi[5] in which a girl of 6 years is said to have become blind with every coughing spell, produced, he thought, by blood stasis.

A. Steffen[6] reports a girl of 8 years of age, who saw indistinctly during coughing spells and lost some of the sharpness of sight in the intervals while the spasmodic stage lasted.

Infectious influences: The consensus of opinion has not settled upon any particular germ as the cause of this disease.

Pronounced leucocytosis,[7] more precisely speaking, lymphocytosis seems to be the only blood change so far observed.

Pathologic changes in the blood vessels have not been reported, I believe; however, the well known predilection that infectious diseases and toxic states have for the vessels, especially of the nervous system,[8] render it possible that fatty changes occur in this disorder in the capillary endothelium of the vessels of the brain and the brain tract we call the optic "nerve."

This infectious disease is characterized by convulsive or spasmodic manifestations. Whether the infective agent excites the respiratory spasm through central or peripheral irritation or inflammation of the nerves supplying the pharynx, is as yet undetermined.

Peripheral neuritis does occur in this disease. Eschner[9] has collected the reports of seven cases. Three of these, the cases of P. J. Moebius,[10] E. Mackey[11] and M. L. Guinon,[12] unquestionably should be so classified. F. A. Craig[13] reports a case which Eschner believes to be an inflammation of the sixth and seventh nerves.

The optic neuritis in the case I have reported is probably intra-ocular, for the especial reason that there has been no disturbance of central vision, no scotoma for red or green, and for the additional reason that peripheral vision is good. I think it is due to the direct action of the toxins of whooping cough upon the nerve tissue. The on-coming of the inflammation during the most acute period of the disease, the second week of the convulsive stage, and the gradual recession of both the neuritis and the spasmodic cough, might favor either the mechanical or the infection theory. If the cause is mechanical, the disturbance is exerted *through* the veins and not *outside* of them as in hemorrhagic extravasation or œdema of the optic nerve sheaths, for the reason that there has been absence of symptoms of brain lesion.

Blood stasis is but a temporary symptom, the equilibrium of the circulation soon being established. It would not account for this condition unless chronic local venous engorgement of the nerve head resulted therefrom, accompanied by diapadesis of the leucocytes, etc.

Such a condition can, I think, be better explained as resulting from the influence of the toxins according to Metschnikoff's theory of phagocytosis.

Generalizations derived from the study of four cases can be, at most, only suggestive.

Conclusions suggested:

1—Optic neuritis complicating whooping cough seems to occur most frequently in girls (four cases all girls).

2—Occurs with and without evidences of cerebral complications.

3—Vision may or may not be disturbed.

4—Prognosis as to sight good when no cerebral complications exist.

5—Optic neuritis may result from direct action of toxins of pertussis upon the nerve head.

BIBLIOGRAPHY.

[1] Alexander—Deutsche Med. Woch. 1888, vol. 14, p. 204.

[2] Jacoby—New Yorker Med. Woch. 1891, vol. 3, p. 45.

[3] Callan—Am. Journ. Ophthalmology, 1884, vol. 1, p. 219.

[4] Knapp—Arch. of Ophthalmology and Otology, vol. iv, p. 448.

[5] Sebrigondi—Quoted from A. Steffen, Ziemssen's Handbuch d. Spec. Path. u. Therapie, vol. 4, p. 278. Leipzig, 1876.

[6] *Loc. cit.*

[7] Mennier, H.—Quoted from "The Blood in Infancy and Childhood." Stengel and White. Philadelphia Med. Journ. Mch. 19, 1902.

[8] Hektoen, Ludwig—Reference Handbook of Med. Science, 1901, p. 93.

[9] Eschner—Journ. Am. Med. Assn., Jan. 10, 1903, pp. 88 to 90, "Peripheran Neuritis as a Complication of Whooping Cough."

[10] Moebius, P. J.—Centralblatt f. Nervenheilkunde Psychiat. u. Gerichtliche Psycho-Pathologie, Mch. 1, 1887, p. 129.

[11] Mackey, E.—British Med. Jour., Aug. 25, 1894, p. 407.

[12] Guinon, M. L.—Rev. Mensuelle des Maladies de l'Enfance, 1901, xix, pp. 327-529.

[13] Craig, F. A.—British Med. Journ., June 13, 1896, p. 1440.

DISCUSSION.

Dr. Wilder.—I saw this case when it came into my service at the Illinois Charitable Eye and Ear Infirmary in Chicago. The peculiar feature is that there should be this disturbance about the head of the optic nerve and yet so little functional disturbance of the eye. The central vision was normal and no contraction of the peripheral vision. The patient still has good central vision, so our only conclusion can be that there was not a very severe inflammation, although the appearance of the outline of the disc suggests beginning neuritis. In this case it was probably a slight œdema of the tissues of the disc and not an exudate, because vision was so good and there was no contraction of the visual field. The veins were somewhat engorged and tortuous. It was evidently a case of beginning neuritis; whether due to the toxins of whooping cough or due to the spasms of coughing is a surmise. We do know there is congestion of the vessels of the head in coughing, and we can understand how intraocular hæmorrhages may occur, particularly if the condition of the blood is such as to allow weakening of the walls. Slight œdema of the nerve or retina might be caused in the same way.

Dr. Gamble (closing discussion).—In reply to Dr. Wilder I would say that the exudate entirely obscured the vessel above spoken of, at one point. The vessel is still obscured at this point to a lesser extent than it was three or four months ago. It has the appearance of having become organized into connective tissue. This is also true of the exudate in the heads of the nerves. Suggestions of bands of connective tissue can be seen. A few months later this condition will be easily demonstrated, I think.

NEURASTHENIC ASTHENOPIA.*

By L. J. Goux, M.D.
DETROIT, MICH.

UPON investigation of text-books and literature on ophthalmology, I find the subject of neurasthenic asthenopia is given such sparse mention that one would be led to regard the disease as of very infrequent occurrence, or else one of such comparative insignificance as to be unworthy of much thought or attention. This has all the more perplexed me in view of the fact that my experience has brought me in contact with a considerable number of these cases. The importance of differentiating them from ordinary cases of ametropia or heterophoria at once becomes apparent, especially since we are at first apt to be misled by the patient whose history as told by herself would naturally lead one to the belief that some form of refractive error or muscular imbalance was the primary cause of the symptoms annoying the patient.

The diversity of results obtained, viz., only partial improvement or no improvement at all following the application of glasses or other treatment, led to a further investigation of this class of cases.

The term "neurasthenia" was invented by Beard in 1868. It is generic term applied to all morbid conditions essentially characterized by exhaustion of the nervous system.

According to the predominating phenomena, Regis has divided it into the following forms: cerebral form (cerebrasthenia), the spinal form (myelasthenia), the cardiac form (cerebro-cardiac neuropathy), the gastro-intestinal form (cerebro-gastric and intestinal neurasthenia), and lastly the genital type (sexual neurasthenia). Therefore it is seen that neurasthenia is not a disease but a group of diseases, a sort of diathesis with a most varied symptomatic expression.

The cause, which is essentially hereditary, takes its origin in the different diatheses, viz., neuroses, psychoses, alcoholism, syphilis, tabes, etc, It will be seen therefore, that in the large majority of cases degeneracy forms the ground work for the development of the malady. Also, the disease may be due to accidental causes such as shock, traumatism, etc.

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As occasional disorders we have all the circumstances physiological or pathological, moral or physical, capable of either suddenly or slowly producing nervous exhaustion; puberty, troublesome pregnancies, disorders of the uterus or intestines, typhoid fever, hemorrhage, venereal diseases, sexual excess, mental strain, great fatigue, etc.

From this short description of the disease it can be seen how varied may be the manifestations of the disease. However, there are certain symptoms that are rarely absent, and they have been called by Charcot "neurasthenic stigmata." They are as follows: headache—frontal and occipital, sensation of emptiness of the head, insomnia and disturbed sleep, psychic adynamia, motor enfeeblement, spinal hyperæsthesia, gastro-intestinal atony, genital and vaso-motor disorders.

The symptoms referable to the head are almost invariably present and are usually of an aggravated form. Herein lies the reason for these patients being referred to or seeking the advice of the ophthalmologist.

Should the specialist not pursue his investigation of the case beyond the history of head symptoms as related by the patient, he will naturally be making the same error as was made by the one referring the case.

My experience with these cases has been somewhat as follows: Vision with or without mydriatic is $^{20}/_{20}$, or nearly so. Of course there may be some refractive error, but it is usually way out of proportion to the intensity of the suffering endured by the patient.

It is assumed that a mydriatic is employed as a routine practice in determining the full amount of error of refraction. One of the first expressions of the patient to put us on guard is the assertion that as the examination progresses there is a continued failure of vision, the patient complaining of fatigue and asking for periods of rest. In taking the field of vision we again note another peculiarity, viz., the longer we continue the test the more constricted becomes the field of vision. In endeavoring to accurately locate the axis of astigmatism, we here come upon another characteristic manifestation of the disease. There is a constant shifting of the axis of astigmatism, and this may be true whether actual astigmatism exists or not. The symptoms may point to the presence of

muscular asthenopia, and it is here that another characteristic manifestation of the disease is found. Employing the Maddox rod test, it is found that there is no permanent point of fixation of the streak, and often there is a characteristic swinging movement of the streak similar to the swinging of the pendulum of a clock. This movement may be confined to one side of the candle flame, but frequently it swings rhythmically from one side of the flame to the other. The two last named manifestations, viz., the variable astigmatism and the uncertain heterophoria, with the characteristic to-and-fro motion of the light streak together with the constricted field and early fatigue of the eye under examination, I consider pathognomic of neurasthenia, especially when there is found no refractive error or one so low as to be out of proportion to the intensity of the symptoms.

Color-blindness is said to be present occasionally, though I have never observed it in any of my cases. Patients may complain of dread of light with blepharospasm, lachrymation, neuralgia, etc., symptoms which point to a supersensitiveness of the retina. Oftentimes blurring of vision seems to be the most disturbing feature of the disease, and insomuch as this renders impossible the continued close application to near work, patients complain most bitterly about it.

In a large percentage of these cases, further investigation will reveal the presence of some of the other stigmata as classified by Charcot. In other words the neurasthenic eye, as it may be called, is only a link in the chain of symptoms characterized as stigmata of this disease. These symptoms alone do not constitute neurasthenia, but as in other forms of degeneracy it is the sum total of all the different manifestations which present the typical picture.

Experience has shown that this disease is almost exclusively confined to young females, though I have noticed it a number of times in women undergoing the menopause. Its sister affliction, hysterical amblyopia, is often associated with it, in which case the diagnosis becomes much simplified.

Going beyond the assertion that these symptoms are due to degeneracy, I should regard them as being due to irregular, spasmodic stimulation of the centers controlling the functions involved.

There is no reason why neurasthenics should not be affected with refractive errors similarly to any other class of patients, and often they are greatly benefitted by a prescription for the proper glasses. However, considering the origin of true neurasthenia, which is essentially central, we are not justified in promising or expecting a cure.

Because of reasons given above, the only reliable test in determining the presence or absence of refractive error is found in retinoscopy, and then the full correction should be worn in case some error can be demonstrated.

As a protection to ourselves and in justice to the patient, she should be given a clear understanding of her condition and be dispossessed of the idea that glasses are to be a panacea for all her sufferings. It should be impressed upon her that rest from near work is the most essential element in establishing relief or a cure. Constitutional treatment may be highly beneficial, though vigorous physical exercise in the open air and gymnastics indoors in inclement weather, I think, will be found most efficient in caring for these unfortunates.

DISCUSSION.

Dr. Griffin.—This class of patients is interesting in its symptomology and variability of refraction. I have at present a case under observation which presents many of the symptoms that the doctor has cited. The patient is a professor in the University of Michigan, who through hard work has been rendered very neurasthenic. To point out a few of the peculiar things about him, he imagines that the ingestion of certain articles of food, e. g., rice, produces a torsion of one of the eyes; and at other times a peculiar sensation about the eyes indicates the presence of a fever. Although he has been tested several times for the torsion and rise of temperature, when these conditions have been supposed to exist, I have not been able to substantiate any such conditions. A test both with and without a mydriatic shows an emmetropic eye upon one side and but $^1/_8$ diopter of astigmatism in the other. The muscular condition varies from time to time, and a correction for his presbyopia does not prove satisfactory. He has consulted ophthalmologists of note in the East with

no results. The fact that he is becoming presbyopic may explain some of the difficulty; one day he feels the need of aid in near work, the next not. A great many persons are troubled in that manner when they begin to wear the presbyopic glass. Another peculiar symptom about my case is the fact that he says he sees two lenses before the eyes, and is always conscious of two fields, although the lenses were carefully centered. I hope some one may give me an explanation of this phenomenon. Of course it is not necessary to add that these cases are unsatisfactory to deal with. They must be handled with a great deal of care and patience.

Dr. Bradfield.—I appreciate the paper and wish to ask the doctor if in this class of cases, when the patients insist that they get no benefit from the glasses, he advises they should wear them constantly or at their pleasure?

Dr. Heckel.—This condition is exceedingly perplexing and calls for all the ingenuity a man possesses, inasmuch as the dynamic refraction varies from day to day and from week to week. It taxes the physician's patience and the patient's patience. It may occur at any age. I had a case recently in a gentleman 65 years of age; he consulted every oculist in the city, including myself, without relief. Sometimes, in spite of everything you may do, glasses are of no avail.

Dr. Goux (closing discussion).—Some neurologists say that these cases are practically incurable, and this I think is true in all cases having their etiology in degeneracy. Cases due to other causes are more amenable to treatment and may be cured or relieved by removal of the exciting cause. In regard to Dr. Bradfield's question, I find that even though I have instructed my patients to wear their correction all the time, if I pin them down to an actual statement I find they are not wearing their glasses as instructed. I take the precaution of telling them to put them on when they get up and to keep them on all day. Sometimes it will be quite a long time before a patient will be able to wear a glass and get any comfort out of it. I have had a number of cases where they could not wear the glasses, though they were correct. The variable condition of the patient, dependent upon the condition of the nervous system, makes the conditions so different from day to day that what you might prescribe as proper to-

day might tomorrow not be satisfactory. These patients will visit every oculist in town, and that is why I point out the necessity of making them thoroughly familiar with the character of their trouble. If they are made to understand this is not a local condition but a manifestation of a general disease, they will be much better satisfied.

DEGENERATE OCULAR CHANGES RESULTING FROM CONSANGUINITY.*

BY LEE WALLACE DEAN, M.S., M.D.

IOWA CITY.

IN presenting to you a short paper on this very interesting subject my main object is to secure your opinions regarding the various points suggested. I would also like to hear of cases of degenerate conditions about the head in children, the result of consanguinity, encountered in your practice. A search in scientific literature has failed to aid me very much in this line of work.

The question of consanguinity in the first degree in its influence upon the central nervous system has often been discussed; its evil results are so apparent that they have resulted in the prohibition of such marriages in many countries. The general bad results have been so manifest that consanguineous marriages were prohibited even among some of the savage people.[1] The Choctaw Indians are divided into two great septs and no man dare marry in his own sept. The Indians do this because they believe it makes a stronger people. Numerous similar cases could be cited.[2]

Among civilized people consanguineous marriage has been prohibited not only by civil law but by ecclesiastical law.

The question as to whether consanguineous marriage does produce degenerate conditions or not, is very nicely stated by Dr. Talbot.[3]

I am sure there is no question today that if there is a perfect parent stock, and if the offspring are perfect, there can be no bad results from consanguineous marriage. How rare it is, however, to find today such a perfect condition. Liv-

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ing as our ancestors have, in unnatural surroundings, and as we do today, has made a perfect stock a rare thing in the human race.

If on the other hand there is in a family some hereditary taint, the consanguineous marriage of the first degree simply doubles the tendency for the development of the hereditary conditions. Such a condition may have been latent for generations and the marriage of first cousins has so doubled the tendency that several of the children will show the same degenerate conditions. Several of the cases cited later in the paper will illustrate this. Atavism indicates that quiescent factors may be present for many generations that cannot be detected.

With the exception of the central nervous system we find the largest variety of degenerate stigmata in the eye. The reason for this is that the eye is really a specialized portion of the brain and is consequently subjected to the same influences as the central nervous system during its development.

The so-called degenerate stigmata found in other parts of the body are frequently considered to be the result of consanguineous marriage. There is no reason why those of the eye should not be so considered. It might be questioned, however, as to whether some conditions like retinitis pigmentosa ought to be placed in this category.

I became interested in this subject because, when several years ago I was investigating the degenerate conditions of the eye, I found a history of a consanguineous marriage of the first degree of the parents of many of the degenerate children.

Because a child has one or two degenerate conditions it is not considered a degenerate. These conditions are so common that the individual is only considered as a degenerate when several stigmata can be found. The number required differs in different schools.

Some of my cases have been so interesting to me that I take the liberty of mentioning them.

Case 1. Male, age 17. Parents, grandparents, uncles and aunts had no serious eye trouble or degenerate stigmata. Parents are bright, well-to-do people. Has three sisters, Bessie, age 15, who is partially blind; Effie, age 9, whose vision is good; and Grace, age 4, who is blind. Here are

four brothers and sisters, three of whom are partially or totally blind. He has three cousins, one boy and two girls, all in the same family. Of these, Louis, age 16, is almost blind; Oran, age 10, cannot count fingers; and the girl, age 13, seems to have unimpaired vision. The trouble in each case was retinitis pigmentosa. The fathers of the two families were brothers and the mothers sisters, and the fathers were cousins of the mothers. As a result of these two marriages we have in one family four children, three of whom are practically blind, and in the other three, two of whom are partially blind.

Case 2. Female, age 14. Father and mother have brown hair. Parents were related. There is no history of malformation or other degenerate stigmata in the family. The girl is very large but weak; she is not intelligent. Her hair is white; iris is a light blue. Examination of the eyes revealed nystagmus $V = {}^6/_{24}$. Fundi without pigment. Diagnosis, albinoism.

Case 3. This is not a single case but the report of a family with six children. The father, Mr. V., and the mother were both dark complexioned. There was no history of any degenerate condition in the family. They were first cousins. They had but six children. Of these, two were dark complexioned and had good vision; the other four were albinos and had a vision $V = {}^6/_{12}$ or less.

Case 4. Female, age 16. Parents second cousins. Patient's teeth were imperfect; she had but three upper incisors, one root germ not having developed. An examination of the eyes revealed V = fingers in 2 m. Her eyes were so small that she had to hold her lids open with her fingers in order to see. On the right side there was a congenital absence of the iris. In the left eye the cornea is elliptical, being 3 mm. wide in a horizontal direction and 2 mm. in a vertical direction. On this side there is a large coloboma of the iris, one-half of the lower portion being absent.

Case 5. Male, age 17. Parents are perfectly healthy. None of his ancestors have shown any signs of degeneracy so far as could be learned. His father and mother were first cousins. He has one brother and two sisters. One of his sisters is an idiot. She has microphthalmus, misplaced ears, and other signs of facial degeneracy. The patient is exceed-

ingly simple minded. His ears are large and placed at right angles to the head The helix is deformed. His face is covered with a growth of silky hair. The lower jaw is exceedingly small and retrusive. He has no adenoids but always keeps his mouth open. Examination of the eyes reveals on the right side a microphthalmic eye with a coloboma of the iris and choroid. On the left side there was an apparent absence of the eye. There were small lids and a socket. No eye could be felt by introducing the finger in between the lids and feeling about in the orbit. The lower part of the socket was deformed. The union between the malar and superior maxillary bone had never taken place. There was a space one-fourth of an inch wide between the two bones. The patient was given an anæsthetic and a dissection of the contents of the orbit was made. The fissure between the malar and the superior maxillary bone was found to extend back to the spheno-maxillary fissure. In the apex of the orbit lying closely against the optic foramen was found a rudimentary eye. It was removed. It was about one-third of an inch in diameter. With the naked eye no change indicating the cornea could be detected. The eye was hardened in formaldehyde and alcohol and stained with hæmatoxylin and eosine. The eye was composed of an outer thick fibrous coat. The cornea could only be differentiated microscopically from the sclera by the absence of an inner lining of pigmented cells. The eye was filled with myxomatous tissue much more solid than the normal vitreous. It contained some blood vessels, one of which was very large. No trace of retinal elements could be found. The internal structures seemed to have all undergone a myxomatous and mucoid degeneration. The lens and retina seemed to be absent.

Case 6. Female, age 5. No history of any serious eye trouble or of degenerate conditions in family. Parents were cousins. Child was very dull. Left eye began to enlarge shortly after birth. O. D. apparently normal, O. S. very much enlarged. Tension normal. Diagnosis: congenital glaucoma, Left. The left eye was enucleated. The usual cupping of the disc was present. Microscopical examination failed to reveal any obstruction of the canal of Schlemm.

Case 7. Female, age 6 months. I saw in consultation

with Dr. Cooling of Wilton Junction, Iowa. Parents were healthy; no history of any tumor or eye trouble in the family could be elicited. Parents were first cousins. The parents said that two months before the right eye began to increase in size, and a few weeks later the left began. The child apparently could not see. Pupils were dilated; would not react to light. Tension in right eye +2, and in left +1. Both eyes were enlarged, the right the more. Lying behind the iris in each eye could be seen a large tumor. Diagnosis: double sided neuro-endothelioma. Four months after the child was seen it died.

Case 8. Male, age 4. Parents' and grandparents' history negative. Parents cousins. Boy has congenital coloboma of iris in each eye and anterior polar cataract in the right eye.

Of 181 children in the Iowa College for the Blind in 1900, nine, or about 5 per cent., were the result of consanguineous marriage of the first degree. The number of consanguineous marriages of the first degree in the state of Iowa is far below ½ per cent. I ought to say that it is exceedingly difficult to secure a history of consanguineous marriage when present. There were probably others present the result of consanguineous union.

If we exclude from the list those blind children who were blind because of blennorrhœa neonatorum, sympathetic ophthalmia, trachoma, etc., and consider only those who suffered because of congenital conditions, we would find that 14 per cent. were the result of consanguineous marriage of the first degree. These figures seem large. I do not think they ought to be considered as indicating the relative proportion of degenerate eyes in families the result of consanguineous marriage and in those not, because we are considering here only one field. Among the pupils who have entered the college since 1900 the per cent. is about the same.

The tendency for the increase of eye trouble amongst civilized races because of excessive use of the eye has had a tendency to increase the bad results of consanguinity on the eye. The Indians have very little eye trouble. About 40 per cent. of the civilized people have eye trouble due to disease from use. This may be a beginning change in the eye for the better. Fuchs believes that the individuals with the school

myopia have their eyes adapted to their work and that the eye is superior to an emmetropic eye. The eye is not perfect, it is changing. The socket is becoming less deep and the superciliary ridges less marked.

The influence of consanguinity on retinitis pigmentosa has been mentioned by several. Dr. Liebreich says that of 26 cases of retinitis pigmentosa, 53.8 per cent. were the result of consanguineous marriage. Magnus reports 33 per cent. of cases of retinitis pigmentosa in children the result of consanguinity. Of 66 cases reported by Chipault, 45 per cent. were the result of consanguineous marriage. Of 18 cases under my observation where the history of the parents could be secured, eight, or 44 per cent., were the result of consanguinity.

Retinitis is a disease that has a great inheritability. I have under observation a grandfather, mother and son, each having the disease. As it is a comparatively rare condition, there is not the chance for doubling the tendency of its appearing by marriage of individuals not related as the more common conditions.

A very careful examination into the history of the ancestors of the cases I mentioned failed to reveal any eye trouble of any importance. Yet in the first group mentioned we have these cases appearing by intermarriage in the two groups when consanguinity took place.

Albinoism is considered by zoologists to be a degenerate condition. Davis[7] says that consanguineous marriage leads to albinoism. Certainly a large per cent. of albinos are the products of consanguineous marriages.

As to whether consanguinity may play an important part in neuro-endothelioma and congenital glaucoma can only be determined by hearing from more cases. The cases of microphthalmus coloboma of iris, congenital cataract, and anophthalmus mentioned are examples of arrest of development. It is interesting to note that the conditions of the eyes are just the opposite to those of the eyeless fishes and worms that have lost the use of eyes that were in their ancestors perfectly developed, owing to generation after generation living in the dark. Wagenmann[8] has found that in these the lens and retina are almost the least of the structures acted upon. That the phyletic degeneration does not follow the reverse

order of development. None of the adult degenerate eyes resemble stages of past adult conditions. In the degenerate eyes, however, we frequently find the eye in one of its developmental stages.

The condition of the eye is not due to local conditions but is due to some central disturbance. With our present knowledge of the physiology of the central nervous system, one cannot say as to whether there are developmental centers—that is, centers which control the growth of parts—or whether there are simply the trophic centers which control their nourishment. The condition is due to a disturbance of the trophic center, or of both if they exist. One may expect these degenerate conditions in the products of consanguineous marriage, because of the increase of some hereditary tendencies in the germ.

By[9] means of the nuclear division and formation of the second polar body, the excessive accumulation of different kinds of hereditary tendencies or germ plasms is prevented. With the removal of the second polar body, as many different kinds of idioplasm are removed from the egg as will afterwards be introduced by the sperm nucleus. If the sperm nucleus contains the same hereditary tendencies as the ovum there will be a greater tendency for these tendencies to become manifest than if the latter were different.

[1] Algonquins, Iroquois, Delaware, Canadian Indians. Huth's Marriage of Near Kin, p. 92.

[2] Huth, p. 93.

[3] Talbot, Degeneracy; Its Causes, Signs, and Results, p. 79.

[4] Liebreich, Deutsche Klinik, Feb. 9, 1861.

[5] Chipault, Etudes sur les. Mar., pp. 58, 59.

[6] Magnus, Die Blindheit.

[7] American Medical Bi-weekly, Vol 12, No. 13.

[8] Archiv für Entwickelung Mechanik der Organe der Menschen, Vol. 8, No. 4.

[9] Ribot, Heredity, p. 366.

DISCUSSION.

Dr. Vail.—This is a very interesting subject and one that is very important. I rise to report that out of seven children in two families where the parents are cousins, I have found five who had congenital cataract. Of the remaining two, one had slight hypermetropia and the other had

hypermetropia of six or seven diopters. In one family there were but two children. The first, a baby, had cataract and the eyes were operated on in the usual way. I enquired of the mother whether she and her husband were blood relatives. She denied that they were. A year and a half later another baby with congenital cataract was brought by the same mother. I asked again if she and her husband were not related, and she confesssed it was true, they were first cousins. She said her husband told her the other time she must deny it, for fear of trouble in the courts. I felt it a duty at that time to tell her that I considered it a social crime for her to bear any more children by this man, and so far as I know they have had no other children.

Dr. Alt.—I had occasion to observe congenital cataract in two children out of four in a family where the parents were first cousins. At the same time I also operated on the grandmother for senile cataract. This was, I think, an additional proof that it was due to consanguineous marriage. I have operated on a number of occasions in a large family in southern Illinois who have, for I do not knowhow long, intermarried. There is a large number of cases of senile cataract and also congenital cataract in the family. The members of this family are so much accustomed to this condition that one of them, who is a physician, comes to me every few months to have me look at his lenses and see if they are beginning to show cataract formation. He told me that his uncle whom I operated on last was, if I am correct, the 43rd case in the family that had been operated upon for cataract.

SARCOMA OF THE CHOROID.*

By W. STANLEY SAMPSON, M. D.

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THE clinical history of intra-ocular tumors published by von Graefe in 1868 was so complete and exhaustive that little remained to be accomplished by his followers. It is not the aim of the author to break the seal placed upon the subject by the illustrious savant, but to content himself with an epitome of his classical monograph. Sarcoma of the choroid is considered a rare disease, and occurs most frequently between the fortieth and sixtieth years, seldom occurring in childhood—differing in this respect from glioma.

Four stages of the disease are distinguished. From the small tumor of the first stage, recognized only by ophthalmoscopic examination by detachment of the retina, to the second stage—that of increased tension—the transition may be sudden. The symptoms of this stage correspond so completely to those of inflammatory glaucoma, that a correct diagnosis is made with the greatest difficulty, and in many cases not at all. Pain is a cardinal symptom in this stage of the disease, and usually sounds the first alarm of trouble to the patient.

The third stage consists in the tumor passing though the sclera and its growth upon the outside. At this period the pain ceases, and the orbital cavity is filled more or less rapidly, depending upon the point of exit. If the sclera is ruptured posteriorly, the ball is pushed forward, and the growth is longer in making its external appearance than were the rupture anterior or lateral. The growth is now more rapid and the tumor may become as large as the fist.

The fourth or metastatic stage of malignant tumor of the choroid is primary in nearly every case, but generalization of the tumor by the development of metastatic nodules in other parts of the body may occur, and especially in the liver.

"Manz reports a case involving both eyes, the original growth developing in the breast."

The prognosis is grave and always proves fatal if the eye

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is not removed early. Berry gives a patient with sarcoma of the choroid, unmolested, five years to live. Of the 285 cases reported on by Fuchs, 13 per cent. recurred, and most of them in a year.

The treatment is enucleation as soon as the diagnosis is certain that the growth is confined to the ball, and exenteration if the orbital cavity is invaded and the whole growth can be removed.

Mrs. M. A. H., 67 years old, farmer's wife, family history

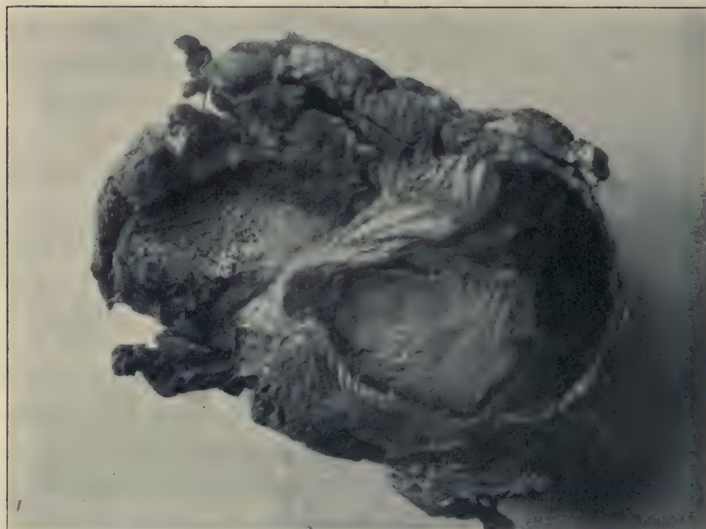

FIG. 1—Sarcoma of the choroid. Growth actual size. The right hand portion of the tumor contains the eyeball; lachrymal gland resting on top.

good, consulted me on Sept. 20, 1901. Seven years ago she suffered severe pain in the right eye, and was treated by her family physician for neuralgia, but without benefit. One year later she became blind in that eye. The pain suddenly ceased, and some time during the winter of 1900 she noticed a growth appearing at the inner canthus of the right eye. On examination I found a dark red mass, filling the orbital cavity and projecting far beyond the frontal eminence. The eyeball formed the outer portion of the growth, and by careful inspection indistinct traces could be seen of the iris and pupil. The growth was immobile and quite firm to the touch. On Oct. 2, 1901, I exenterated the contents of the

orbital cavity. The growth after removal measured 5 x 5 x 7 cm., was highly pigmented and vascular. (See figure). The optic nerve and the muscles were consumed in the sarcomatous process, excepting the external rectus, which was held by a few remaining fibres to the optic foramen. The remaining portion of the optic nerve was caught by forceps and severed by curved scissors as far back as possible. After a thorough curetment the cavity was dusted with nosophen and packed with sterile gauze. The repair process was rapid and at the end of ten days the patient was discharged. There was no recurrence of the disease, but the patient died fourteen months later from metastatic involvement.

According to the patient's statement, pain preceded blindness in the eye one year, differing in this respect from the typical clinical history found in the text books on ophthalmology. A section through the growth bi-secting the eyeball, gives a clear idea of the point of rupture. A microscopical examination of a section made from the lachrymal gland shows round and spindle cells, pigmented. A section from the optic nerve shows a predominance of spindle cells.

Only recently my attention was called to the following interesting case: C. T., aged 26; excellent family history. When 15 years of age he was struck in the right eye with an arrow, made from an umbrella wire, thrown from a crossbow in the hands a playmate. There was no perceptible wound inflicted, and the eye caused no trouble until two years after, when he noticed that vision began to fail in that eye. Five years ago dark nodules began to appear on the superior surface of the ball, which seem to have pushed their way directly through the sclera. The growth is firmly attached to, or in other words is a part of, a tumor mass filling the eyeball, and when the nodules are viewed separately resemble coffee grains. The relationship of the iris is not interfered with, but the growth can be seen in close proximity to the iris by means of a strong lens and oblique illumination. The patient has been totally blind in this eye for two years. At no time has he experienced pain in or about the eye, and there is not the slightest tenderness on pressure at this time. This case has every symptom of sarcoma, save pain, which, as above stated, never was present. Glioma can

be excluded by the patient's age and the pigmentation. We do not purpose going into the etiology of this disease, but consider the pathologic lesion in this case produced by trauma. Operation was refused and our diagnosis cannot be verified by microscopic examination, but the clinical history is at such a variance with that of the usual case that we venture this report.

BIBLIOGRAPHY.

Berry—Diseases of the Eye.
Fuchs—Text Book of Ophthalmology.
Noyes and Oliver—System of Diseases of the Eye.
Knapp's Archives of Ophth. and Otol.
Haab—Hand-Atlas of External Diseases of the Eye.

DISCUSSION.

Dr. Vail.—Within the past six months I have removed the entire contents of the orbit, including the eyebrow, eyelids, lacrimal gland, sac—in fact all the orbital structures, and while it seemed a most heroic operation, it was one of the easiest I ever attempted. I was surprised to find out how easy it was to shell out the orbital contents. The incision was simply carried around the outside to include the whole neoplasm, down to the bone, through the periosteum; then by means of the raspatory the periosteum was stripped up and followed around. It stripped off so easily it almost fell out. You just sweep around with your periosteotome, like taking a pie out of a pan, then with the scissors clip off the impacted mass of tissues in the apex of the orbit.

Dr. Alt.—If I understood rightly, the author said that in the secondary stage there is always detachment of the retina. Twenty-five years ago this was held to be correct, but it has been proven untrue. In some cases there is detachment of the retina, in others the retina and growth are grown together, and consequently no detachment can occur.

Dr. Bradfield.—I wish to suggest that in cleaning out the orbit it is always safest to have the thermal cautery handy when the apex is reached. I would ask the doctor how he covers the orbit after the operation.

Dr. Vail.—In regard to the dressing, I simply packed the orbital cavity. The hæmorrhage was insignificant. It commenced, but we put in a packing of bichloride gauze, and

the hæmorrhage stopped. I would hesitate to use the galvanic cautery or the chromic acid in the apex of the orbit, as I regard either to be dangerous—it is so close to the brain. It was the purpose of the after-treatment to be especially careful not to introduce germs from the outside. The dressing was of bichloride gauze, left for several days. Granulations gradually formed and it took four or five weeks for the periosteum to form and epitheliate. It was not necessary to do plastic surgery.

Dr. Wilder.—It is easy to strip off the periosteum, as Dr. Vail says. I feel better satisfied, as Dr. Bradfield says he does, when I have the cautery with me. In one case I had severe hæmorrhage. By gently touching the bleeding point with the galvanic cautery at a dull red heat you can sear these vessels perfectly, and I do not think such treatment is dangerous. Sometimes these cases, where exenteration of the orbit has been performed, will take a long time to heal. I have taken long ribbon strips of Thiersch grafts and with them lined the orbit, thus concluding the case more promptly. By waiting for the new epithelium to form, the healing process is much longer, and it seems to me there is greater danger of recurrence in the low grade granulation tissue.

Dr. Sampson (closing discussion).—It is hard to describe this operation, but it is very easy to do, as Dr. Vail says. It was necessary to make a canthotomy on account of the size of the growth. In this case we controlled the hæmorrhage with sterile gauze. Skin grafting was not necessary in this case. I was prepared for hæmorrhage, but there was no more than we could expect in enucleation. If the lids are in a healthy condition, it is advisable to save as much as possible.

OBITUARY.

SIMON POLLAK.

On Saturday, October 31st, Dr. Simon Pollak, the Nestor of the St. Louis ophthalmologists and aurists, died at his home in St. Louis, at the ripe old age of almost 90 years. Born in Bohemia, he studied medicine at the University of Vienna, Austria, from which he graduated in 1835. A few years later he came to America to practice his profession and had soon acquired a lucrative practice so that in spite of severe pecuniary losses, due mainly to the change in the course of the Mississippi River, he was able to return to Europe for further studies. During these years he chiefly paid attention to diseases of the eye, especially at Vienna, Berlin and Paris. Thus he was extremely well equipped at the period at which he settled down in St. Louis, in 1845. In consequence, he soon enjoyed a large and lucrative general practice with ophthalmology and otology as specialties of preference. He is said to have used the plaster of Paris bandage as the first in America. He is given credit by the best alienists of this country for having introduced the humane treatment of the insane now in use. He was one, and probably the chief one, of the founders of the St. Louis School of the Blind, and in 1860 started the first Eye and Ear Clinic in St. Louis, in what is now the St. Louis Mullanphy Hospital. This Clinic he attended with regularity and unswerving interest and zeal until the day of his death. While not a frequent contributor to medical literature, he has published a number of articles on various subjects, some of which may be found in Knapp's Archives and this Journal. In his younger days his influence in the local medical world was undoubtedly a great and beneficial one. The honorable positions held by him during his long career have been numerous. He had a keen thirst for knowledge and a clear intellect up to the last. His charity was untiring and his death is a sore loss to many outside of his family.

ALT.

BOOK REVIEWS.

LESSONS ON THE EYE, for the use of the undergraduate students. By F. L. HENDERSON, M.D. Third edition. Philadelphia, 1903: P. Blackiston's Sons & Co.

This modest little volume, evolved from two previous private editions, has served the author as a guide for his students. It is concisely written and profusely illustrated, and may well be recommended to students.

TEXT-BOOK OF DISEASES OF THE EYE, for students and practitioners of medicine. By H. F. HANSELL, A.M., M.D., and W. M. SWEET, M.D., with chapters by C. R. HOLMES, M.D., C. A. WOOD, M.D., D.C.L., and W. REBER, M.D. Philadelphia, 1903. P. Blackiston's Son & Co. Price $4.00.

This is another beautiful and excellent text-book on diseases of the eye, the number of which seems to be growing almost too fast. That the subject matter is treated in a masterly way goes without saying, as it comes from the pen of such well-known authors and teachers. It is printed in excellent large type and its illustrations are excellent throughout. It is bound to have a wide circulation.

THE BLOODVESSELS IN THE LABYRINTH OF THE EAR. By G. E. SHAMBAUGH. Decennial Publications of the University of Chicago.

The author has carefully studied the blood supply of the labyrinth of sus scrofa domesticus. He was most careful and painstaking in his investigations which are laid down in this pamphlet, supplemented by beautifully executed illustrations. Every one interested in the anatomy of the ear should study this most interesting little volume.

ALT.

PAMPHLETS RECEIVED.

"Nephritic Eye Lesions," by W. O. Nance, M.D.

"A Pharyngeal Aneurism," by C. W. Richardson, M.D.

"Keratosis of the Pharynx," by C. W. Richardson, M.D.

"Report of a Few Mastoid Cases," by L. R. Culbertson, M.D.

"Purulent Ophthalmia of the New-Born," by W. O. Nance, M.D.

"Operative Treatment of Abnormal Tonsils," by J. A. Donovan, M.D.

"Ocular Manifestations in Chronic Bright's Disease," by G. E. de Schweinitz, M.D.

"Congenital Cyst of the Eyeball; Microscopical Examination," by Arnold Knapp, M.D.

"The Treatment of Chronic Suppuration of the Middle Ear," by J. F. McKernon, M.D.

"The Extirpation of the Lachrymal Sac; its Indications and Technique," by Arnold Knapp, M.D.

"The Importance of the Surgical Treatment of Chronic Middle-Ear Suppuration," by E. B. Dench, M.D.

"Occlusion of the Superior Temporal Artery of the Retina in a Young Anemic Girl," by G. E. de Schweinitz, M.D.

"A Case of Localized Tuberculosis at the Head of the Optic Nerve; Microscopic Examination," by Arnold Knapp, M.D.

"Gumma of the Iris and Ciliary Body with Histological Study of the Enucleated Eyeball," by G. E. de Schweinitz, M.D.

"Concerning the Terms: Antimetropia and Anisometropia Brachymetropia and Hypometropia in Place of Myopia; Hypermetropia and Hyperopia," etc., by G. F. Suker, M.D.

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ORIGINAL ARTICLES.

SOME REMARKS ON THE INFLUENCE OF ENVIRONMENT ON THE EYE.*

By HAMILTON STILLSON, M. D.

SEATTLE, WASH.

MR. DARWIN, in his "Variations of Plants and Animals Under Domestication," quotes Dr. Lucas' remark that "there is not one single faculty of the eye which is not subject to anomalies." This statement Mr. Darwin proceeds to verify by quoting a list of cases of various anomalies transmitted, organic and functional—such as, for instance, in the first class, cleft iris, albinism, muscle anomalies, etc., and in the second class, color-blindness, night-blindness, day-blindness, etc.

What we need to remember is that inherited and transmitted anomalies are but accumulated acquired traits. These traits, usually so slight as not to be noticeable, become emphasized and magnified by transmission. Natural selection and adaptability to environment often work together.

This is beautifully seen in the rudimentation of the eye. The rudimentation of the eyes of the mole, for instance, is due partly to non-use of the eyes, and partly to the inflammation of the eyelids or nictitating membranes from the presence of dirt. And, "as eyes are certainly not necessary

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to animals of subterranean habits, a reduction in their size, with adhesion of the eyelids and a growth of fur over them might in such cases be an advantage, and natural selection would aid the effects of disuse." So, too, with the eyes of the cave dwellers. "In some of the crabs the foot-stalk remains though the eye is gone"—clearly a rudimentation from disuse.

In the case of the cave rat, the neotoma, specimens have been captured a half mile from the daylight that have had eyes lustrous and large, but blind. It has always seemed to me that the opponents to the belief in *asthenopia ex anopsia* had not made the acquaintance of the neotoma. The evidence of these graduations of the effects of environment on rudimentation is remarked by Schiodte. "We accordingly look upon the subterranean fauna as small ramifications which have penetrated into the earth from the geographically limited faunas of the adjacent tracts, which, as they extend themselves into darkness, have been accommodated to surrounding circumstances. Animals not far remote from ordinary forms prepare the transition from light to darkness; next follow those that are constructed for twilight, and last of all those destined for total darkness, and whose form is quite peculiar."

Thus, from Schiodte's point of view, by the time an animal had reached, after numberless generations, the deepest recesses, disuse will have more or less perfectly obliterated its eyes. This view is held by Lyell, by Agassiz, who was the first to describe the *amblyopsis*, and in fact by all naturalists so far as I know.

If these acquired traits may be transmitted, would it not be well to impress upon our minds the importance of the effect of daily environment upon the eye, such effects as come from occupation, climate, habits, etc.? The eye in its embryological development is formed by a juxtaposition of two saucer-shaped layers. The eye, then, is, as a rule, at birth hyperopic (perhaps astigmatic), and over-use of the eye in early childhood tends to deform it more. The statistics looking towards the effects of occupation upon the production of myopia are not yet sufficiently studied to warrant a definite conclusion, but we might say in general terms that the prolonged use of hyperopic or emmetropic eyes at near

vision will tend to the production of myopia. The infrequency of myopia among watchmakers may be accounted for by the fact that as a rule watchmakers use a microscope before one eye in viewing the object manufactured.

But the prevalence of myopia among students is proverbial. The effects of school life upon the eyes are dwelt upon at length in the text books, and we may safely relegate this part of the subject to the text books. But I cannot refrain from quoting one or two pregnant remarks. Risley, in Norris and Oliver's "System of Diseases of the Eye," sums up the production of myopia in school life by saying: "The obvious association of the increasing percentage of myopia with the work of the schools seemed naturally to fix the responsibility for the disease upon the educational process, and led directly to efforts for the discovery and reform of faulty educational methods." And again, "The obvious lesson is that our children enter upon their educational training at a too tender age, and that during the first years at school the methods of instruction should be so modified as to avoid as far as possible continuous work at a near point."

The manner in which miners acquire nystagmus has been well observed. The semi-darkness of the mine, the semi-recumbent position of the miner with his head diagonally upward, and the constrained position of all the muscles including those of the eye, produce such a want of harmony in the ocular muscles as can only be expressed by nystagmus.

I, myself, have observed that among the old school potters there usually exists a high degree of hyperphoria. The position of the potter at his lathe is semi-recumbent; he stands upon his right foot with his body leaning upon a back-rest. His left foot is pressed against the tread of the lathe, while his head is bent forward toward the right and his eyes look into the vessel that is being turned, and into which his right hand is inserted. This produces habitual torticollis and a hypertrophy of the lower left rectus and the right upper rectus. A right hyperphoria of 4 degrees is not uncommon among such potters.

I seem to have noticed also a great prevalence of high degrees of astigmatism among the Sisters of Charity. These nuns usually wear a head-dress shaped like an old-fashioned

sunbonnet, the front part projecting from four to six inches in front of their faces, and is lined with white. With such blinkers on the Sisters can only look straight forward or demurely down. There is, therefore, little lateral pressure against the eyeballs, and if the Sister has entered the service early in life, high astigmatism seems inevitable. At any rate, in my observation astigmatism is quite prevalent among them.

We are all familiar with the type of ocular fatigue produced by a change of residence from the country to the city. The visitor from the country unaccustomed to glancing rapidly from side to side at closer range than usual soon fatigues the ocular muscles, producing a nausea somewhat similar to that produced in some cases by a ride upon a street car.

A similar condition is often brought about by the amateur typewriter. The frequent movements of the eyes from the copy to the keys of the finger-board soon produce incoordination. This confusion seems to be produced more rapidly if astigmatism exists, and if the keys be round. Some manufacturers of typewriting machines have noted this fact and now manufacture their machines with octagonal or square keys instead of round ones.

Many other disturbances of the eye from occupation will doubtless occur to you.

I wish to refer to the effect of change of climate upon the eye. I seem to have noticed that persons who have migrated from the south to the north have much more difficulty with their eyes than persons who have migrated along the same parallel of latitude. The population of the Puget Sound district, for instance, is very cosmopolitan; many of the inhabitants are from the southern states, many of them from Mexico. Many of them, indeed, migrate in the summer months to Alaska and return. The effect of this north and south migration, especially during the first few seasons, seems to be productive of retinal congestion, or optic neuritis. This, of course, would be particularly the case if the patient suffered from snow-blindness during his visit to Alaska, and the neuritis would then be accompanied by conjunctivitis and corneitis.

Another peculiarity is the effect upon these patients of

a change from a sunny clime to a cloudy one. The north Pacific coast is foggy and humid. This humidity seems to chill the surface of the body, preventing perspiration. To a person accustomed from infancy to rapid perspiration (such as would be produced by a warm, sunny climate), there would exist a demand for increased activity from the kidneys, and the demand is often greater than the kidneys can comply with. In consequence of this the kidneys often become inflamed and unable to perform their function. Retained products of waste very frequently produce retino-choroiditis and optic neuritis. So, too, in regard to the use of the eyes in this foggy atmosphere; a person accustomed to bright skies finds it difficult to use the eyes at prolonged near work in a climate whose skies are usually overcast by cloud. So that while persons from Scotland, Ireland or Scandinavia have very little difficulty in accustoming their eyes to the climate of Puget Sound, those from the Mediterranean, the southern states and Mexico, have great difficulty in doing so. I ought to observe, however, that the Scandinavians in migrating to the northwest country suffer degeneration in other ways. Dr. Ivar Janson, in the January number of the *Northwest Medicine*, gives a very graphic account of his observations upon his countrymen. He mentions the fact that while confined to their mountains in northern Europe these people live an Arcadian life, becoming vigorous, large and well proportioned, remarkably free from disease. Yet upon migrating to the northwest there is a rapid degeneration physically and mentally. "The proportion of Scandinavians in the hospitals for the insane is quite appalling." "And tuberculosis * * * seems to make up for lost time for past immunity. * * * I give tuberculosis twenty-five per cent. of all the dead of the first descendants of people whose environments and means of sustenance for untold generations had formerly been stable and fixed."

I wish to observe also that persons migrating from the southern Pacific coast to the northern Pacific coast experience at first a peculiar somnolence. In my own case, while a resident of California, five hours' sleep each night seemed ample, and indeed during the summer months three or four hours' sleep nightly was all that

was obtainable on account of the heat. But at Seattle nine hours' sleep nightly seems indispensible—ten hours desirable. This "letting down of the nerves" has a peculiar effect on the habits. At Victoria the older business houses open at 10 A. M. and close at 2 P. M., and the major portion of the time is spent in eating and sleeping. A noteworthy change is observable in women. Women who in California are unable to conceive usually become quickly pregnant upon migrating to the Puget Sound country. Women seem, however, to reach the menopause early in the north, often as early as the thirty-fifth year, though girls are slower in reaching puberty. Puberty is sometimes delayed until the twentieth year. These changes in the "habits of the nerves" have a profound influence on the eyes, inducing among other phenomena very early manifestations of presbyopia.

In the far north—in Alaska for instance—the monotony of the long dreary nights in winter induces profound neurasthenia, particularly in women; and in all classes prolonged confinement indoors, and continued efforts at reading to kill time, make their injurious impression on the eyes.

Not to extend this paper unduly, let me close with the remark that what I have said has been said not to exhaust the subject but to call forth a discussion.

RARE OCULAR LESIONS IN SCARLATINA.*

By ELLET O. SISSON, M.D.

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Member Ninth International Ophthalmological Congress.

THE ocular lesions that occur in scarlatina are of particular interest for the reason that they are generally of a more or less serious nature. Scarlet fever, unlike diphtheria, is a disease that the average specialist does not come in contact with. It is handled in nearly every case by the general practitioner, and it is only when the eye symptoms are of a prominent character that a specialist is called in, and as a result the connection between many eye diseases and scarlet fever is lost sight of. Among the rarer lesions we have

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uræmic amaurosis, purulent inflammation of the vitreous, phlegmon of the orbit, and thrombosis of the cavernous sinus.

In uræmic amaurosis, which occurs more frequently than the other lesions, the blindness comes on suddenly and gets to be complete within a few hours or a day. After one or more days the sight is gradually restored.

Simultaneously with the attack of visual disturbance other nervous symptoms exist, such as headache, vomiting, dyspnœa, loss of consciousness and convulsions. The fact that the reaction of the pupil to light is in most cases preserved in spite of the complete blindness, proves that the location of the affection cannot be in the eye or in the optic nerve, but higher up—that is, in the brain, which is poisoned by the excretory matters contained in the blood. Cases are reported by Ebert,[1] Förster,[2] Monod,[3] Power,[4] Loeb [5] and Martin [6]. These cases were quoted by Förster,[7] who called attention to the fact that in all of them albuminuria was present, and that the amaurosis occurred in the desquamation stage after a period of generally favorable symptoms. The amaurosis was ushered in by cerebral symptoms, headache, convulsions, vomiting and stupor. It came on suddenly, was bilateral, and for a time was complete. No ophthalmoscopic lesions were detected, and the blindness gradually cleared off.

Purulent inflammation of the vitreous or suppurative hyalitis is the product of a metastatic choroiditis, which sometimes follows in the wake of scarlet fever. In this lesion if the cornea is clear, a yellowish reflex is seen shining through the pupillary space, there is retraction of the periphery of the iris and bulging of its pupillary border. Usually one or two synechiæ are present and the tension is diminished. In addition to this, there may be a pericorneal zone of congestion connected with the inflammation of the iris and ciliary body.

When the pus in the retina is circumscribed the symptoms at the first glance are not unlike those of glioma of the retina, and the name pseudo-glioma has been given to this condition, especially as it is seen in children.

In phlegmon of the orbit we have an inflammation of the cellulo-fatty tissue surrounding the eyeball. It is of metastatic origin and is generally of the acute form. It is usually

monolateral, although it may be bilateral. Constitutional symptoms generally accompany it, such as chills and fever, and not infrequently cerebral symptoms, such as headache, vomiting, mental hebetude, retardation of the pulse, etc. The local symptoms are exophthalmos, limitations in the movements of the eye and swelling and œdema of the lids, together with hyperæmia and chemosis of the conjunctiva. When the symptoms have reached their acme the skin of the lids at a certain spot grows red, then shows a yellow discoloration, and finally is peforated by a discharge of pus. After the evacuation of the pus, which is present in large quantity, the inflammatory symptoms in most cases rapidly subside and the opening soon heals again. The sight may suffer permanent diminution or be altogether annihilated, if the optic nerve is implicated, for, inflammation of the optic nerve or thrombosis of its vessels may develop, succeeded by atrophy of the nerve. Detachment of the retina and even panophthalmitis, also, occasionally occurs in retrobulbar phlegmon. If the suppuration is carried over from the orbit to the cranial cavity it leads to a fatal issue through purulent meningitis or abscess of the brain.

In thrombosis of the cavernous sinus we have a lesion which from the pathologist's view-point is of particular interest. That the lesion is a rare one is shown by the literature on the subject, there having been only 182 cases the result of various causes reported up to date. Of this number only fourteen recovered. The lesion is set up metastatically. The symptoms are very prominent and are similar to those which present themselves in the beginning of a retrobulbar phlegmon. The lids and the conjunctiva swell up with œdema, and the eyeball is protruded and becomes hard to move. The veins of the retina are seen, upon ophthalmoscopic examination, to be distended enormously with blood. These symptoms are referable to the fact that the veins of the orbit discharge the greater part of their blood through the ophthalmic veins into the cavernous sinus; if the latter is occluded an extreme degree of venous stasis in the orbit necessarily takes place and leads to protusion of the eyeball and also to venous hyperæmia of the retina. At the same time there may be a doughy œdema in the mastoid region. This œdema

depends upon the fact that in this region an emissary vein of Santorini empties into the transverse sinus and thus indirectly into the cavernous sinus, so that when there is occlusion of the latter this region also shares in the venous stasis. When this œdema is present it forms an important diagnostic sign between thrombosis of the cavernous sinus and retrobulbar phlegmon, in which latter it is absent. A further point of difference lies in the fact that thrombosis of the sinus frequently passes over to the other side, so that the same complex of symptoms develops there also, while, on the contrary, a bilateral orbital phlegmon would be one of the greatest rarities.

Wells and Germain [8] report a case that was operated upon, the cavernous sinus exposed, incised and drained. The patient died, but they claim that by the operation they demonstrated that the sinus is not inaccessible, that it may be reached without grave danger to the patient, and at least a low mortality from the operation itself, that it can be done under almost primary anæsthesia, not associated with any degree of shock, finished within a few minutes—in their case eight—and that the hæmorrhage is easily controlled. They also claim that an incision into one sinus instantly and completely relieved the interference with the circulation in both.

Retinitis albuminurica occurs after scarlatina, but is not frequent; it is more a complication of the chronic form of Bright's disease than of the croupous nephritis which is found in scarlatina. The prognosis is more favorable than in albuminuric retinitis unconnected with an exanthem, but partial optic atrophy has been observed [9].

The sight can also be affected as the result of scarlatina without the presence of albuminuria or any evidence of any kidney disease, as in the cases recorded by Hodges [10], where thrombosis of the central artery was observed in one eye of a growing girl while recovering from scarlatina. In this case the urine was normal, so that the ocular lesion may possibly be attributed to debility induced by the disease.

Pflüger [11] has observed papillo-retinitis after scarlatina without kidney affection, and the same phenomenon has been observed by Betke [12] though in the latter case the patient had suffered at an earlier period from hemiplegia. Leber [13] re-

ports a case of a boy who became blind without ophthalmoscopic signs and with normal urine. The only assignable cause was latent scarlatina, and Leber seems to regard this peculiar case as somewhat analogous to the post-diphtheritic lesions in other nerves.

Occasionally accommodative asthenopia shows itself after scarlatina as it does after measles. It may persist for a long period of time even after the general health is completely re-established. Förster instances the case of a boy of 9 years who suffered from caries of both temporal bones and complete paralysis of both facial nerves. Both corneæ were destroyed in consequence of the lagophthalmus, and the unfortunate patient became blind as well as deaf. Fuchs, in his text book, states that suppurative choroiditis of metastatic origin may occur in scarlatina as in typhus, variola, etc. In most, if not in all of the recorded cases, suppurative otitis has preceded the choroiditis (or retinitis). Phillips[14] has observed an œdema of the upper eyelid during scarlatina which also is apparently associated with suppurative otitis. The swelling was not white and doughy as in renal dropsy, but tense and livid, and in the cases recorded it was more marked before rupture of the membrana tympani, and increased afterwards if the discharge from the ear became less free. Phillips considers it probable that the affection is connected with thrombosis of the cavernous sinus.

As the result of this brief study of the more rare eye lesions that occur in scarlatina we are justified in arriving at the following conclusions:

First. In view of the fact that scarlet fever is one of the most common of the exanthemata, and that the majority of eye lesions occurring in connection with it are of a serious nature, involving not only loss of vision but in some cases life itself, greater attention should be given them than they generally receive.

Second. That if the operation on the cavernous sinus can be made without grave danger to the patient, and with the chance of lessening the mortality as claimed by the operators, such an operation is justifiable and should be performed.

BIBLIOGRAPHY.

[1] Förster, Graefe und Sæmisch's Handbuch der gesammten Augenheilkunde, Bd. VII. S. 162.

[2] Förster, R., Scarlach mit nachfolgender Nierenerkrankung und transitorischer Erblindung, from Jahrbuch für Kinderheilkunde und physische Erziehung in Klinische Monatsblätter für praktische Augenheilkunde, 1872, S. 346.

[3] Monod, Albuminurie aiguée consecutive á la scarlatine, convulsions èpileptiformes, amaurose, guèrison, Gazette des Hôpitaux, 1870, p. 113; Jahresbericht der Ophthalmologie von Nagel, 1870, S. 370.

[4] Power, Case of Complete but Temporary Loss of Vision in an attack of Scarlet Fever, Practitioner, May, p. 257: Jahresbericht der Ophthalmologie von Nagel, 1871, S. 341.

[5] Loeb, Transitorische Erblindung und persistirende Paralyse nach Scharlach, Jarbuch für Kinderheilkunde, Bd. VIII., S. 194; Förster, loco citato.

[6] Martin, St. Bartholomew's Hospital Reports, 1867, p. 246. Temporary Blindness after Scarlatinal Nephritis with Dropsy. Förster, loco citato.

[7] Förster, Græfe und Saemisch, Handbuch, loco citato.

[8] Boston Medical and Surgical Journal, May 1, 1902.

[9] Horner, Zur Retinalerkrankung bei Morbus Brightii, Klinische Monatsblätter für Augenheilkunde, 1863, S. 71; Höring, Retinalerkrankung bei Morbus Brightii, ibidem S. 215.

[10] Ophthalmic Review, vol. iv., p. 296.

[11] Pflüger, Neuritis Optica, Archiv für Ophthalmologie, Bd. XXIV. 2, S. 180.

[12] Betke, Amblyopie nach Scarlatina, Klinische Monatsblätter für Augenhelkunde, 1869. S. 201.

[13] Leber, Graefe und Saemisch's Handbuch der gesammten Augenheilkunde, Bd. V. S. 1048.

[14] Phillips, Sydney. Cases of Œdema of the Upper Eyelid during Scarlet Fever, British Medical Journal, 1895, Vol. 1, p. 194.

SOME RARE OPHTHALMIC CASES.*

By JAMES MOORES BALL, M.D.

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I. CONGENITAL ANOPHTHALMOS.

BABY C., female, was born in St. Louis on August 25, 1902. The mother was in labor twenty-four hours, and the delivery was instrumental. This was her first child. The mother was shocked by the death of a friend in January, and by a fire in February.

When one week old, this child was examined by me at the request of the family physician, Dr. W. F. Kier. I found

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the babe entirely well formed with this exception—the eyeballs were absent. The lacrimal glands were enlarged and tears appeared when the lids were held apart. The conjunctiva was of normal appearance and extent. Owing to the absence of the eyes there was a sunken condition of the lids, which is shown in the accompanying photograph. In front of each ear was a small, hard lump which was about one-half inch in diameter. Apparently these were inflammatory thickenings. They did not disappear. The little patient died in February, 1903, from inanition. Whether the masses were rudimentary eyeballs could not be determined, since a postmortem examination was refused.

FIG. 1.—Congenital Anophthalmos.

Cases of congenital anophthalmos are of very infrequent occurrence. Von Hippel[1] has collected sixty-four cases of bilateral and twenty-three of unilateral congenital anophthalmos. In the twenty-three unilateral cases the other eye was normal in fifteen, four eyes were microphthalmic, one presented coloboma of the iris and chorioid, one showed a high degree of hypermetropia, and one presented an anomaly of the optic-nerve sheath.

II. DISCOLORATION OF THE CORNEA WITH BLOOD PIGMENT.

This is a rare and peculiar condition of the cornea—one which involves some nice points in diagnosis and which has been made the subject of study by such eminent observers as

Vossius,[2] Treacher Collins,[3] J. B. Lawford,[4] J. E. Weeks,[5] and John Griffith[6].

Mr. Wm. C., aged 37, native of Ireland, a blacksmith, was admitted to the St. Louis City Hospital in April, 1900. Two years before this time, while operating a punching machine, a piece of steel struck the right eye. The steel was a large piece and dropped from the eye. It is supposed that no part of it remained in the eye, although the history is indefinite. The eye was treated by a physician, and the patient states that one month after the injury an operation was made on this eye. He states that up to this time the injured eye was of the same color as its fellow, but immediately after the operation the right eye became of a reddish-brown color as at present. Before this time he could read large print with the right eye; immediately after the operation vision was reduced to light perception.

At the time of my examintion of this case the entire cornea was of a brick-dust color. Oblique illumination showed the presence of wavy lines of vessel-like structures, which were probably distended lymph-channels.

In case of blood-staining of the cornea there is first a blood clot in the anterior chamber due usually to trauma or operation, although the hæmorrhage may have occurred spontaneously in old cases of retinal detachment. In nine of seventeen cases mentioned by Collins the tension was increased; in six others it was normal or minus. The phenomenon may occur at any age.

As regards diagnosis, it will be necessary to distinguish between hæmorrhage into the anterior chamber, forward dislocation of the lens, and blood-staining of the cornea. When the whole cornea is stained it cannot be distinguished from distension of the anterior chamber with blood, but if a peripheral clear zone is present the distinction can be made. When the central part of the cornea is of a rusty-brown color from blood-staining and the periphery is clear, the condition so much resembles that of an amber-colored lens dislocated forward that the best observers have been in doubt. It would seem that focal illumination ought to be of value in making the diagnosis.

As regards the nature of the pigment which is distributed

through the cornea, the micro-spectroscopic and chemic examinations of Collins show the discoloration is due mainly to crystals of haematoidin. with or without haemosiderin, which enter the cornea in solution in blood diffused through Descemet's membrane. After a period varying from two to many years the discoloration disappears, the periphery being the first to clear up. Treatment of this condition seems to be useless, although alteratives may be tried.

III. A CASE OF MELANOSARCOMA OF THE LOWER EYELID.

Miss C. D., of Jennings, Mo., aged 22, came to my clinic in February, 1903. When three weeks old she had a "gathering" in her left nose with discharge of pus. When the swelling subsided a small black spot remained just below the tendo oculi of L. E. After taking cold it was larger. Ever since she can remember there was epiphora of L. E. She came to me on Feb. 10th with pain and inflammation of inner canthus and adjacent skin tissues. A fluctuating oval tumor measuring 6x8 mm., was situated immediately below the left tendo oculi. This cyst I opened with a von Graefe cataract knife, evacuating about one drachm of yellowish fluid. The diagnosis of dermoid cyst connected with the upper part of the naso-lacrimal canal was made.

After evacuating the fluid the dark cyst walls remained. The cyst refilled until one week later the lower canaliculus was slit and a lacrimal probe was passed. This evacuated the fluid in the cyst. Ten days later I excised the growth. A microscopic examination, which was made by Dr. Carl Fisch, showed the mass to be a melanosarcoma.

[1] Die Missbildungen und angeborenen Fehler des Auges. Leipzig, 1900.

[2] Vossius—Archiv für Ophthalmologie, Band xxxv., Abtheilung ii, S. 207.

[3] Lawford—Transactions of the Ophthalmological Society of the United Kingdom, vol. viii., p. 60.

[4] Collins—Ibid., vol. xi., p. 43.

[5] Weeks—New York Eye and Ear Infirmary Reports, vol. i., part i., p. 37.

[6] Griffith—Transactions of the Ophthalmological Society of the United Kingdom, vol. xiv., p. 74.

ON CONGENITAL "DEFECTS OF MOTILITY" OF THE OCULAR MUSCLES.—REPORT OF TWO CASES.

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WHILST congenital ptosis and nystagmus are relatively frequent and therefore have been studied for a long time, it is only of late that congenital affections of the extrinsic eye muscles have found due consideration. The first collection of such cases and the sharp limitation of the clinical picture we owe to Dr. Carl Kunn (Deutschmann's Beiträge zur Augenheilkunde, 1895). He collected seventy-three cases including seven of his own, and later added twelve more. (ibid. 1895 and 1897.)

Nevertheless, the subject is very briefly considered in the text-books appearing after this date. Landolt, in Norris and Oliver, dismisses it with the few sentences: "Mention should also be made of the *congenital paralyses* of the ocular muscles. They are not so rare as seems to be generally supposed. Schapringer (New Yorker Medicinische Monatschrift, Ueber angeborene beiderseitige Pleuroplegie, December, 1889) relates a case of congenital paralysis of the sixth and seventh pairs (abducens and facial)."

De Schweinitz (ed. 1902) says: "A number of cases of *congenital palsy*, especially of the external rectus, have been observed, which in some instances may have been due to a lesion affecting the nucleus of the implicated nerve during intra-uterine life. In addition to this there are anomalies of the external muscles depending on their abnornal insertions. Entire absence of a muscle has been noticed. Occasionally cases of orbital muscle palsy have been attributed to various so-called *reflex disturbances*."

Fuchs touches on at least some of the vital points by saying: "Paralyis of the ocular muscles may be of *congenital* occurrence. Mention has already been made of congenital ophthalmoplegia. The most frequent congenital paralyses are those of the abducens. It is a remarkable fact that in these, contrary to what takes place in acquired paralysis, contracture of the antagonists does not set in; both eyes have a perfectly proper position as long as the gaze is not directed

towards the side of the paralyzed muscles. An inability to turn the eye upwards has been observed occurring coincidently with congenital ptosis. Autopsies have shown that in this case the rectus superior was absent. Perhaps in this case, as in many other instances of congenital paralysis, the primary disease is to be looked for in the nerve nuclei (Moebius)." In the new Graefe-Sämisch (chapter on muscles, by Alfred Graefe), I could find no mention of the subject.

On the other hand, Panas, in his edition of 1894, deals with the subject quite extensively, quoting mainly from Mauthner, who in his monograph on ocular paralysis, 1889, devotes two pages to congenital affections. Mauthner foreshadows the conclusions arrived at by Kunn by stating: "From these premises it follows that, if extrinsic ophthalmoplegia develops after birth it is undoubtedly due to a disease of the nuclei, but if the affection is undoubtedly a congenital one, an anomaly or absence of the eye muscles may be the cause." Kunn tried to make the division between these two forms more pronounced by excluding the latter from the general head of paralyses and by choosing for them the term, "Defect of Motility" (Beweglichkeitsdefekte), and his convincing arguments lead me to adopt his nomenclature.

The two following cases have come under my observation within the last five years:

C. R., boy, æt. 6 years, seen in 1899. Vision about normal in each eye (tested by dots and pictures). Ref., obj. + 1.0 s. Fundi normal.

In the right eye, ptosis of medium degree. Eyeball cannot be moved upwards, and very moderately inwards. The movement downwards is somewhat better, accompanied by a rotatory motion (action of the superior oblique). When looking straight forward the axes appear parallel; sometimes there seems to be a very slight divergent strabismus. When looking to the left the strabismus increases. Double pictures cannot be elicitated. Pupillary reaction and accommodation normal.

This condition has been noticed since birth. The boy has sisters and brothers, and it was stated that they, as well as the parents, were not affected in a similar way.

A. D., girl, aet. 10 years, seen first in 1902. Vision in right eye $^6/_{60}$, after correction $^6/_{20}$. (–1.5 s. $\bigcirc$ + 3.0 cyl. ax. 70°) Vision in left eye $^6/_{20}$, after correction $^6/_{12}$. (–1.0 s. $\bigcirc$ + 2.5 cyl. ax. 115°) Reads Sn I with each eye after correction. Fundi normal.

There is rotatory nystagmus in both eyes. The eyes can be moved to the right as well as to the left in a limited degree only. The motion upward lags also behind, but is somewhat better. Downward it seems to be about normal. On a second visit, one and a half years later, the extent of the movements was measured with the perimeter and was found:

R. E.	Mesially, 20°.	Laterally, 10°.
	Upward, 35°.	Downward, 55°.
L. E.	Mesially, 25°.	Laterally, 20°.
	Upward, 40°.	Downward, 55°.

The convergence is intact. Patient can converge up to 10 cm.

The pupillary movements and the accommodation are also normal.

Double pictures can not be elicitated by any of the usual methods.

Patient is the only child of her mother, but has one half-brother and one half-sister. According to their histories there is no similar defect in any other member of the family.

In the first case we have a paretic condition of the levator and of the extrinsic muscles controlled by the motor oculi. The movement downwards was accomplished mainly by the superior oblique. The intrinsic muscles, sphincter iridis and ciliary muscle were intact. This feature invariably has been found in congenital motor deficiencies. The affection was unilateral.

In the second case both eyes were affected, but the right eye slightly more than the left. The levators were free. Besides the nystagmus, not only the extrinsic muscles controlled by the III. nerve, but also the external recti were affected. Here, again, the superior oblique muscles seemed to possess the strongest functional power. The pupillary movements and accommodation were likewise unaffected.

Another characteristic feature in this case was the integrity of the movements of convergence which could be exe-

cuted easily to the normal near point. The same internal recti, which showed insufficient action in the associated movements, functionated perfectly in the conjoined movements. Such a condition is remarkable and is also pathognomonic for congenital lesions, as it has never been found in acquired pareses. I shall refer to this point later on.

I therefore consider these two cases congenital ones, less on account of the history given than because of the characteristic features. We all know how unreliable the former is; frequently the condition is not noticed at once, and when observed later on is attributed to some incidental disease or a trifling accident. Furthermore, after the appearance of Moebius's communications on "Infantile Nuclear Atrophy" (Ueber infantilen Kernschwund), it was held by many that this acquired disease of the nuclei of the motor nerves was responsible for the large majority of these cases. It is, therefore, the merit of Kunn to have demonstrated that besides the history, which must be taken *cum grano salis*, there are objective symptoms by which these two clinical pictures can be distinguished.

The points for differential diagnosis between congenital defects and acquired nuclear paralyses are:

(1) In the congenital forms, frequently a palsy of the associated movements is found while the convergence remains intact. In the acquired this strange relationship is never met with. My second case is a typical illustration. A satisfactory explanation of this phenomenon is still wanting.

(2) In the latter, sooner or later, secondary contraction of the antagonist takes place, causing strabismus; in the former, no contraction takes place, and we frequently find, therefore, parallelism of the axes in the primary position (when looking straight forward).

(3) Congenital defects are frequently one-sided, while infantile nuclear palsy always affects both sides.

(4) The congenital are frequently accompanied by other defects of development, e. g. facial paresis, etc.

(5) In the acquired palsies there are double pictures; and if one picture is habitually suppressed, and therefore no double vision complained of, it can easily be elicitated by our usual tests. In the congenital, the eyes never acted together,

there was never binocular vision; therefore double pictures cannot be elicitated. In the second case, where the patient was old enough to give intelligent answers we made long and careful tests, but with the usual negative results as to double vision.

The congenital form affects frequently some members of the same family; the acquired are isolated cases only.

The above reasons are sufficient to separate the congenital deficiencies as a group *sui generis* from all acquired palsies. The different forms of it are: simple ptosis, uni– or bilateral; ptosis combined with a paresis of one or more branches of the motor oculi, i. e., those controlling the extrinsic muscles, the intrinsic ones remaining intact always; finally, complete ophthalmoplegia exterior, where the external recti and superior oblique are also involved. Then, isolated paresis of the abducens, uni- or bilateral, is found; here ptosis is always absent.

As to the relative frequency, uncomplicated ptosis and uncomplicated nystagmus rank first; then, affections of the abducens, and finally those of the motor oculi, with or without ptosis, up to complete ophthalmoplegia exterior.

Our knowledge of the causes of these congenital defects is a limited one. In a number the defect was found to be a muscular one. Already, in the eighteenth and in the first half of the nineteenth century, some cases were published where, at the post-mortem, absence of ocular muscles or nerves was demonstrated. The oldest one, possibly, was related by Olbers, in 1781, in a dissertation. He describes a case where both eyes could not be moved to the left since birth, and where Wrisberg found at the autopsy that the internal rectus of the right eye and the external rectus of the left were entirely wanting. Stellwag, in his text-book, mentions some instances of absence of external muscles and nerves in case of microphthalmia. In other cases, after the introduction of operative procedures, the defect was discovered during these.

Dieffenbach, the father of tenotomies, reports an instance of bifurcation of the internal rectus in the orbit, and some others where the muscles were inserted far back and poorly developed.

A more minute description is given by Baumgarten (Ammon's Monsch. f. Augenh. u. Chir., 1840): "During the operation, which was done in two sittings, there were found, instead of an internal rectus, thin but firm fibrous cords running in the direction of the internal rectus, between conjunctiva and sclera. They appeared too fibrous to be taken for muscular tissue, but too firmly organized for membranes. An anomalous insertion of the muscles was out of the question; I had to deal with a substituted tissue. Instead of forming one large muscular band, the individual fascicles were spread out as isolated muscular fibres, the interstices of which were filled with connective tissue."

Steinheim (Klin. Monblt. f. Augenh., 1877) found that the superior rectus of one eye was entirely wanting, and drew the conclusion from the clinical picture that the superior rectus and the levator palpebræ of the fellow eye were likewise absent.

Uhthoff (Jahrb. v. Schœler's Klinik, 1881) reports a case where in both eyes the internal rectus was very rudimentary, a thin, dense cord. The tendon was only one-third of the normal size and inserted at the normal place. The presence of striated muscular fibres could not be demonstrated in spite of dissecting way back. The tendons of the external recti were very broad. The condition was identical in both eyes.

Lawford (Ophth. Review, 1887) found at the post-mortem of a man, who had been affected throughout his entire life by a deviation of both eyes to the right side, that the internal rectus of the right eye was entirely absent, and that the external rectus of the left eye was very rudimentary.

Kunn (l. c.), in a girl of 12 years, discovered instead of a levator muscle a delicate cord of connective tissue, and in an excised piece, no trace of muscle fibre could be demonstrated under the microscope.

Bernhardt (Neurol. Centrbl., 1890) was the first to communicate the findings of the nervous apparatus. A boy 5 months old showed since birth a facial paralysis of the right side. He was unable to move the right eye laterally and it stood fixed in an inward deviating position. The left eye was in a similar position but could be moved laterally to

a certain extent. In consequence of anæsthesia in the area of the trigeminus, a neuro-paralytic keratitis developed later on. Patient died a year afterwards of bronchitis. There was found a round focus of softening in the right half of the pons, and another which had destroyed the lower part of the right corpora quadrigemina totally, and the upper nearly so. The nuclei were found intact by microscopical examination as well as macroscopical. This latter finding is the most interesting in this case. It proves that the lesion must have been located more centrally. The connection between the paralytic condition and the destruction in the corpora quadrigemina remains open to discussion, because our anatomical knowledge relating to the course of the sixth nerve between its cortical centre and its nucleus is insufficient.

The foregoing data seem to be all that have been published that give us a clew as to the cause of these congenital defects. While they are not many their harmony is of value, and they prove without doubt that in a certain number the deficiency is a muscular one. But it is hardly permissible to extend such a supposition to all cases, and certainly in a larger number, it is the nervous apparatus which is at fault. This applies, first of all, to those instances where the associated movements are involved, while the convergence remains unaffected. For we can hardly assume that a muscle, which is atrophic or wanting, and is therefore unable to functionate for one movement, could do so for another,

Here the lesion must lie in the centers which govern the coordinated movements. Whether in the other cases, the lesion is a nuclear, subcortical or cortical one can only be conjectured. The relative frequency of acquired nuclear paralysis might speak in favor of the supposition that the nuclei are at fault in the majority of the congenital deficiencies also; the only evidence we possess (Bernstein) does not support such an assumption, and further additions to our knowledge must be awaited.

As to the therapeutics, the best procedure in deficiencies is *noli me tangere.* The operations which have been performed in such conditions have not given satisfactory results.

ASTIGMIA OR ASTIGMATISM—WHICH?

By SWAN M. BURNETT, M.D., PH.D.
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THERE can be no question that much of our nomenclature in ophthalmology is sadly lacking in precision and accuracy.

It must be evident that a name, especially where something like scientific precision is expected, should carry a definite meaning and serve as a means of differentiation from all other things, even though it be not accurately descriptive; the least that should be demanded of it is that it should not be misleading. Many of our names in ophthalmology have come down to us from an antiquity more or less remote, and having become firmly established in usage and thereby acquired a clearly defined meaning not applicable to anything else, can very well be allowed to hold their places even though their derivation be fanciful or far-fetched. Among these in the domain of refraction are myopia, presbyopia, and I would be willing to add hypermetropia, since by a stretch of definition it can be made to apply to an eye with its far point beyond (above) the standard measure of infinity.

It may be further conceded that any change in an accepted nomenclature should be allowable only when there is some definite gain in clearness to be arrived at or an obvious error to be corrected.

There is one term, however, in common use in ophthalmology to which custom, backed by the most eminent authority, has given the stamp of its approval to which none of these justifications apply, and which should not, in view of the facts, be allowed to stand without a protest which should not be regarded as either pedantic or hypercritical. That term is "Astigmatism," which is intended to define that optical condition in which rays eminating from one point are not all again united (positively or negatively) in another point.

According to our highest authorities in ophthalmic optics the term has its derivation from "*α*—privative, and *στιγμα*—a point." Donders states in the introduction to his little book, "Astigmatism und cylindrische Glæser," published in Berlin in 1862 (translated from the Dutch by Dr. C. Schweig-

ger): "Rev. Dr. Whewell hat, wie Mackenzie mittheilt, das Gebrechen, welches Airy von seinem linken Auge beschreibt mit dem Namen Astigmatismus bezeichnet, Dies Wort ist abgeleitet von α, privatum, und στιγμα, von στιζω, (Latin *pungo*), und soll ausdrücken, dass Strahlen die von einem Punkte ausgehen, sich nicht wieder in einem Punkte vereinigen" (p. 10).[1]

Referring now to Mackenzie we find on p. 927 of the fourth edition of his "Treatise on Diseases of the Eye," published in 1854, the following statement: "Having occasion twenty years after the first account of the malformation of his left eye was submitted to the Cambridge Philosophical Society, to explain that a change had happened in the state of the eye, Mr. Airy took an opportunity of mentioning that as the nature of the effect of the malformation was that the rays of light coming from a luminous point and falling upon the whole surface of the pupil did not converge to a point at any position within the eye, but converged in such a manner as to pass through two lines at right angles, the Rev. Dr. Whewell affixed to this phenomenon the term *astigmatism*."[2]

So it appears we have to go back to England, not only for the first accurate description of this peculiar form of optical refraction in the eye (in Young and Airy), but also for its name.

Now, whether Whewell or Donders or some one else originated the method of its derivation from the Greek, I have been unable to discover. It is evident, however, that he, whoever it was, took στιγμα-ατος to mean a *point*, in the sense of a mathematical point.

It is true that the root of στιγμα is στιζω, which means "to prick or puncture," as well as "to burn a mark in, to brand—passive, to be spotted," but only in the sense of a disfigurement as to tattoo, and it is in this sense of a mark or taint that the word has become commonly accepted. Liddell and Scott, the acknowledged authorities in this country at least, make στιγμα to mean "a prick or puncture of a pointed instrument, a brand, a mark; generally a mark—spot."

In making the selection of the Greek word from which to derive the term descriptive of the condition, the origina-

tor evidently overlooked the fact that there was another substantive derived from the same root, στιζω, which had the very meaning he was in search of, namely, στιγμη-ης, which, according to Liddell and Scott, means "a prick, mark, puncture, a *mathematical point:* (Latin, *punctura*)." Besides, the Greek word στιγμα has been transferred bodily to our language with the definite meaning of a mark or stain, as when we speak of the "stigma of crime or guilt." It is also current in our medical literature, as when we refer to the "stigmata of scrofula, syphilis, etc." No such definition attaches to στιγμη, which still retains its meaning of a point—and what is more pertinent to our needs, a mathematical point, and synonymous with the Latin *punctum.*

The only possible excuse that can be offered for the retention of "Astigmatism" is that it is already established in usage and is sufficiently exact for practical purposes. This, however, can hardly be considered valid in the light of what has been shown above as to the undoubted incorrectness of the term in its accepted meaning of something entirely different from the idea meant to be conveyed. We surely do not wish to convey the impression, when we refer to an eye suffering from "astigmatism," that it is "without spot or blemish." Moreover, in this branch of medical science we are supposed to stand for mathematical precision, and the stigma of inaccuracy is upon us if we fail to meet the requirement in every case. It should never be too late to reform a bad habit into a good one, or to abandon an erroneous position when once the error is clearly demonstrated.

Furthermore, it appears that Whewell himself became convinced that the word he had introduced was not etymologically correct, and approved of another shorter and less open to objection on the ground of derivation. Apparently it was Dixon who first called attention to the error and suggested another word more in keeping with the correct derivation. In his article on vision in "Holmes's System of Surgery," Vol. III., p. 21 (note), Lea Bros. & Co., 1881, he says: "Astigmism would be the more correct term, στιγμη (στιγμης), being commonly used by Greek writers to express a geometric point, while στιγμα (στιγματος) always signifies something material, more or less visible or tangible

—a puncture, mark or spot. I took the liberty of pointing this out to the late eminent scholar, Dr. Whewell, who had originally suggested the word astigmatism, and he approved of astigmism as being etymologically the better formed word.'' [3]

It is evident that Whewell had hastily and apparently without due consideration selected a word which he found out afterwards not to be the correct one, and thus fastened upon our nomenclature a term which we, with a reverence for authority, which seems in this case not to have been justified, have slavishly continued to use.

It probably should be mentioned that this word, astigmism, as the synonym of astigmatism, is to be found in the Century Dictionary with a reference to ''Notes and Queries,'' 1886, where it is recorded as appearing in ''Additions and Amendments to the New English Dictionary.'' [4] It is also to be found in ''Dorland's Medical Dictionary,'' 1900, as a synonynm, also in ''Dunglison's Medical Dictionary,'' 1903, which also gives astigmia. It may be found elsewhere though I have not been able to discover it. But so far the attempt to introduce the term ''astigmism'' has not been followed by any measure of success. And it is perhaps well that this has been so, for while etymologically there may be nothing against it, it fails in one important point, and that is in terminology.

By convention all words associated with or descriptive of the optical conditions of the eyes or their motility, end in *ia*. Thus we have myopia, asthenopia, esophoria, esotropia, etc. In uniformity with these we should have ''astigmia.''

The proper adjective to the term would be ''astigmic,'' a word preferable in every way, aside from its correctness, to ''astigmatic.''

Then, again, aside from its entire correctness the new word commends itself for its shortness, crispness and euphoniousness, in marked contrast to the long, uncouth and barbaric sound of the other, which reaches the limit in the German ''Astigmatismus.''

We find, once again, that ''they order this matter better in France.'' In the number of the *Ann. d' Ocul.* for March, 1895, Dr. Georges Martin, of Bordeaux, suggested the French word

"Astigmie," as a substitute for the incorrect and cumbersome "Astigmatisme," giving the reasons therefor, and citing the authority of such eminent French Helenists as M. Ouvriè and M. Monnier in support of his contention. He gives examples of words similar in derivation from the Greek, having a like termination, as for instance, α—privative, and φωνή—voice—aphonie. The English of this is, of course, aphonia. Since then several other writers in French have used the term, and in a recent article in the *New York Medical Journal* (1903, No. 6) Dr. G. J. Bull of Paris has brought it to the attention of the profession in this country. Already several prominent ophthalmologists in the United States have announced their preferencc for and their determination to use the correct term, astigmia. Prof. H. Knapp, to whom we are indebted for the first thorough and scientific investigation of the asymmetry of the refracting media, informs me, through a second communication, of his intention to do so. Dr. Edward Jackson of Denver favors the change, as does also Prof. A. A. Hubbell of Buffalo; and there are no doubt many others of equal prominence not known to me who have adopted the new term.

In the interest of exactness, correctness and uniformity of nomenclature it is hoped that ophthalmologists everywhere will lend their influence towards a general use of the term which commends itself in so many ways for adoption. Only a little effort is necessary to supplant very soon the old, unsuitable word by the new and correct one.

[1] The first actual mention by Donders of the word, however, is in an article in "Graefe's Archiv," B. VII., Abt. 1, 1860, p. 176. under the heading, "Astigmatismus," though throughout the text he uses the word "astigmatisme " He gives, also, the derivation from the Greek as above, and credits it indefinitely to "Englische Autoren." This is, so far as I can determine, the first use of the word in German. Hirschberg in his "Wörterbuch der Augenheilkunde," 1887, gives "στιγμα oder στιγμη." Evidently he disapproves of the accepted derivation and says: "Wer aber findet ein Deutsches Wort für Astigmatismus?"

[2] The exact words used by Airy were as follows: "(A geometrical phenomenon to which the term astigmatism was very happily affixed by the, present master of Trinity College)." Trans. Cambridge Philos. Soc. 1846. The manner of the derivation of the word from the Greek is not given.

[3] As Whewell died in 1866 it is evident that the error in the derivation of the word was discovered very soon after the appearance of the work of Donders in 1862. It seems unaccountable that the matter was not taken

up by other investigators, but in no text-book at my command is it even referred to. We have all blindly followed Donders.

[4] The statement in "Notes and Queries" is as follows: "Astigmatism (no history of the word), Astigmism (not in dictionary, 1870)." The late eminent scholar, Dr. Whewell, who originally suggested the word astigmatism, approves of astigmism as being etymologically the better word. (Dixon in "Holmes's System of Surgery," Vol. III. second edition, note p. 7, 1883). Astigmism is also given as a synonymn of astigmatism in "Quain's Dictionary of Medicine."

ABSTRACTS FROM MEDICAL LITERATURE.

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TREATMENT OF ATROPHIC RETINÆ WITH RETINAL EXTRACT.

Robert W. Doyne (*British Medical Journal*, July 25) had a case of retinitis pigmentosa with a great loss of central vision and contraction of the field of vision, who took a sea voyage which produced violent retching and vomiting; after a night's rest there was great improvement in his vision, which lasted several weeks. Believing this to be due to the increased amount of nutrition brought to the starved retina through the congestion produced by vomiting, the author conceived the idea of supplying the retinal constituents by feeding the patient with raw retinæ of sheep and oxen. Great improvement has been noted in cases of retinitis pigmentosa, retinal degeneration in high degrees of myopia, in choroiditis, and tobacco amblyopia. The extract prepared under the name of "Optocine" has, according to the author, all the value of fresh retinæ.

A NEW OPERATION FOR DETACHED RETINA.

Leopold Miller (*Münchener Med. Wochenschrift*, June 9) has operated on seven cases with excellent results. The method consists of three steps: (1) Temporary resection of the external margin of the orbit according to Krönlein. (2) Exposure of the bulbus. (3) The excision (posteriorly) of a

small portion of the sclera (a piece 8 to 10 mm. broad by 20 mm. long); the evacuation by puncture of the subretinal transudate through the site of the removed portions of the sclera; and the union by sutures of the edges of the excision so as to put this coat of the eyeball somewhat upon the stretch. While, by this method, it is not possible to evacuate all of the subretinal fluid, experience has shown that the portion which remains is rapidly and completely absorbed. The anterior chamber is not abnormally deepened, as might be expected, by the operation.

PLASTIC ARTIFICIAL VITREOUS IN MULES' OPERATION.

E. L. Oatman, (N. Y. Academy of Medicine, Ophthalmic Section, Nov. 17, 1902) reports three cases in which paraffin, with a melting point at 120° F,, was used instead of a glass ball. He says this modification of Mules' operation requires more extended trial before its value can be estimated, and draws the following conclusions:

Paraffin used for this purpose is prone to produce a fistula by softening and getting between the lips of the wound, or into the track of a suture. These accidents are to be avoided by using paraffin, or some modification thereof, that will not soften at body temperature; also by so suturing the scleral wound that no aperture remains through which paraffin can exude. A plastic material like paraffin will adapt itself to any inequalities on the surface of the glass shell, and ulceration from pressure is not apt to occur. Paraffin beads are easily prepared, and may be used in special cases in which glass beads of the required shape or size are not obtainable.